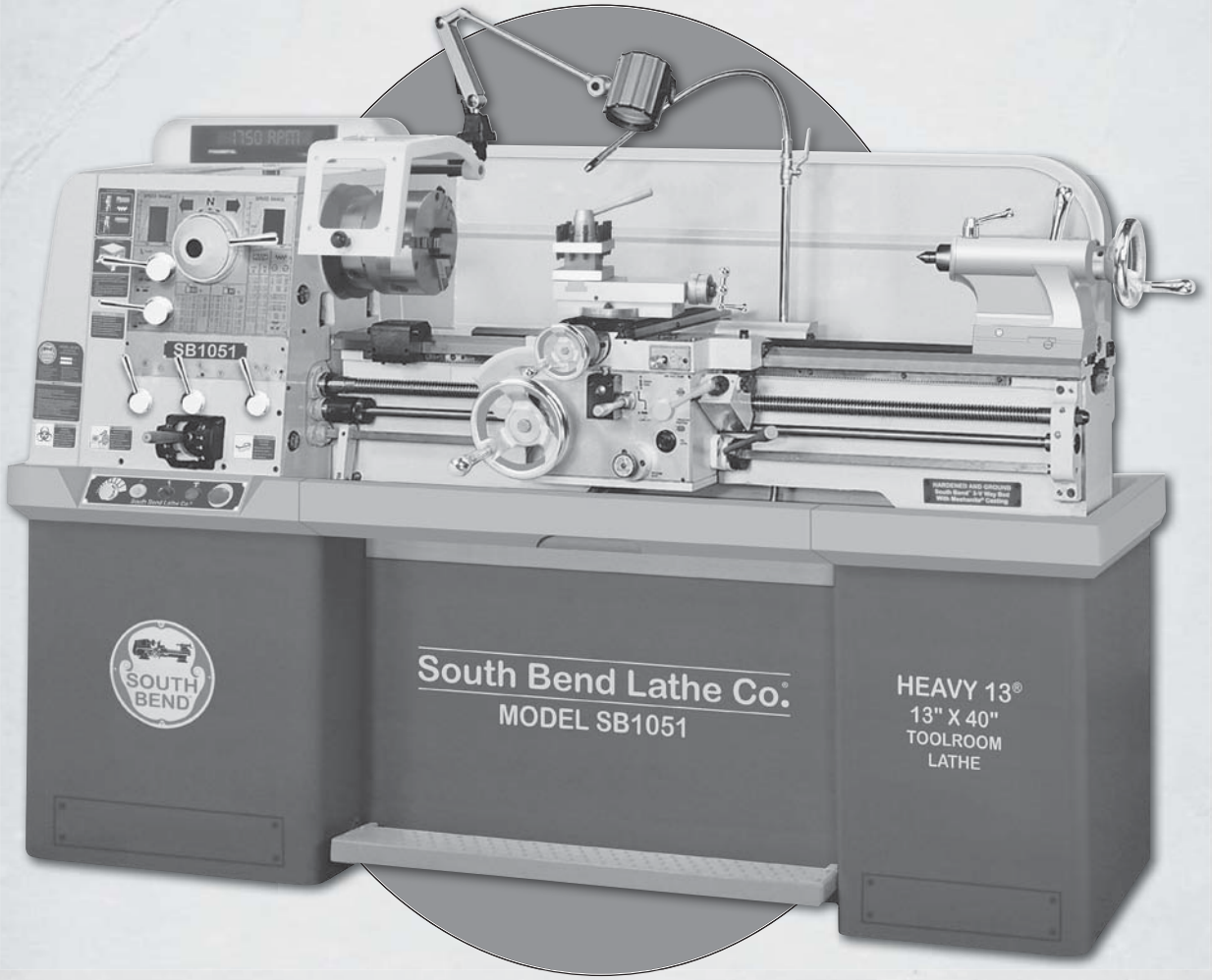
13" X 40" HEAVY 13® EVS LATHE

MODEL SB1051



OWNER'S MANUAL

South Bend Lathe Co.®

Hundreds of Thousands of Lathes Sold With a Tradition of Quality Since 1906!

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For Machines Mfg. Since 5/11

Scope of Manual

This manual helps the reader understand the machine, how to prepare it for operation, how to control it during operation, and how to keep it in good working condition. We assume the reader has a basic understanding of how to operate this type of machine, but that the reader is not familiar with the controls and adjustments of this specific model. As with all machinery of this nature, learning the nuances of operation is a process that happens through training and experience. If you are not an experienced operator of this type of machinery, read through this entire manual, then learn more from an experienced operator, schooling, or research before attempting operations. Following this advice will help you avoid serious personal injury and get the best results from your work.

Manual Feedback

We've made every effort to be accurate when documenting this machine. However, errors sometimes happen or the machine design changes after the documentation process—so the manual may not exactly match your machine. If a difference between the manual and machine leaves you in doubt, contact our customer service for clarification.

We highly value customer feedback on our manuals. If you have a moment, please share your experience using this manual. What did you like about it? Is there anything you would change to make it better? Did it meet your expectations for clarity, professionalism, and ease-of-use?

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Updates

For your convenience, any updates to this manual will be available to download free of charge through our website at:

www.southbendlathe.com

Customer Service

We stand behind our machines. If you have any service questions, parts requests or general questions about your purchase, feel free to contact us.

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About This Machine

Foreword

"*The screw cutting engine lathe is the oldest and most important of machine tools and from it all other machine tools have been developed. It was the lathe that made possible the building of the steamboat, the locomotive, the electric motor, the automobile and all kinds of machinery used in industry. Without the lathe our great industrial progress of the last century would have been impossible.*" —**How To Run a Lathe**, 15th Edition, South Bend Lathe.

The lathe represented in this manual is a modern day version of the screw cutting lathes that trace their roots back to the 1700's, which were themselves technological improvements of the bow lathe that can be traced back thousands of years to the ancient Egyptians.

Now, almost 300 years later, these modern "screw cutting" lathes are not just a piece of refined machinery, but a culmination of human ingenuity and knowledge embodied into the design and synergy of thousands of interworking parts—some of which represent the life's work and dreams of many inventors, mechanical engineers, and world-class machinists—including the likes of Leonardo da Vinci, Henry Maudsley, and the founders of South Bend Lathe, John and Miles O'Brien.

And now the torch is passed to you—to take the oldest and most important type of machine tool—and carry on the tradition. As the operator of a South Bend Lathe, you now join the ranks of some very famous and important customers, such as Henry Ford, who used the machines he purchased to help him change the world.

Capabilities

This Heavy 13® EVS Lathe is built for daily use in a busy industrial setting. Loaded with many nice features and high-precision parts, this lathe excels at making fine tools, dies, thread gauges, jigs, and precision test gauges—however, it is by no means delicate. Thick castings, heavy weight, and quality construction throughout provide the necessary brawn for demanding production and manufacturing tasks.

Features

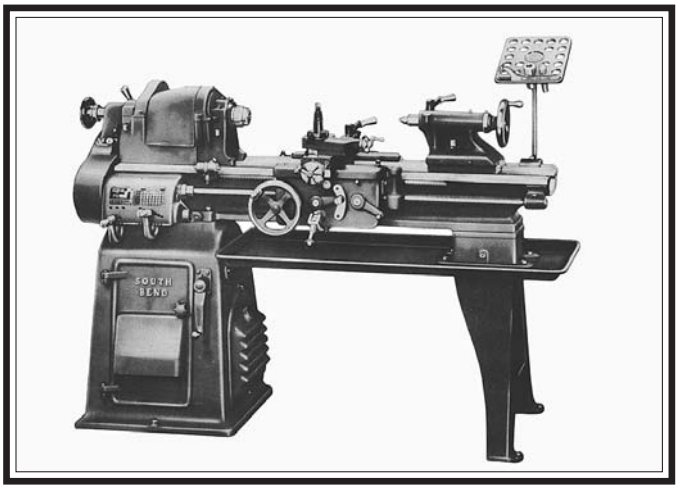
This Heavy 13® EVS (Electronic Variable Speed) Lathe is packed with standard features and equipment, such as an electronic variable speed spindle control, a complete coolant system, easy-to-clean chip drawer, one-shot way lubrication system, steady and follow rests, chuck guard, adjustable work lamp, foot brake, powered cross feed, 3- and 4-jaw chucks, faceplate, and premium Allen-Bradley electrical equipment.

Spindle speeds are controlled electronically with the turn of a dial and readily visible on the top-mounted digital display.

The bed is constructed with Meehanite castings that are hardened and precision-ground in the traditional three V-way prismatic design—long used on South Bend Lathes for its accuracy, durability, and rigidity.

The headstock features quick-change gear levers and the carriage includes a feed rod clutch that disables automatic carriage feed when it contacts the adjustable feed stop collar.

To ensure a high degree of accuracy and a long-lasting operational life, this lathe is equipped with Japanese spindle bearings. The spindle is a D1-5 camlock with an MT#5 taper and 1.65" bore. The tailstock has an MT#3 taper and 4.5" of quill travel.



13" South Bend Precision Toolroom Lathe
(*Circa 1958*)

General Identification

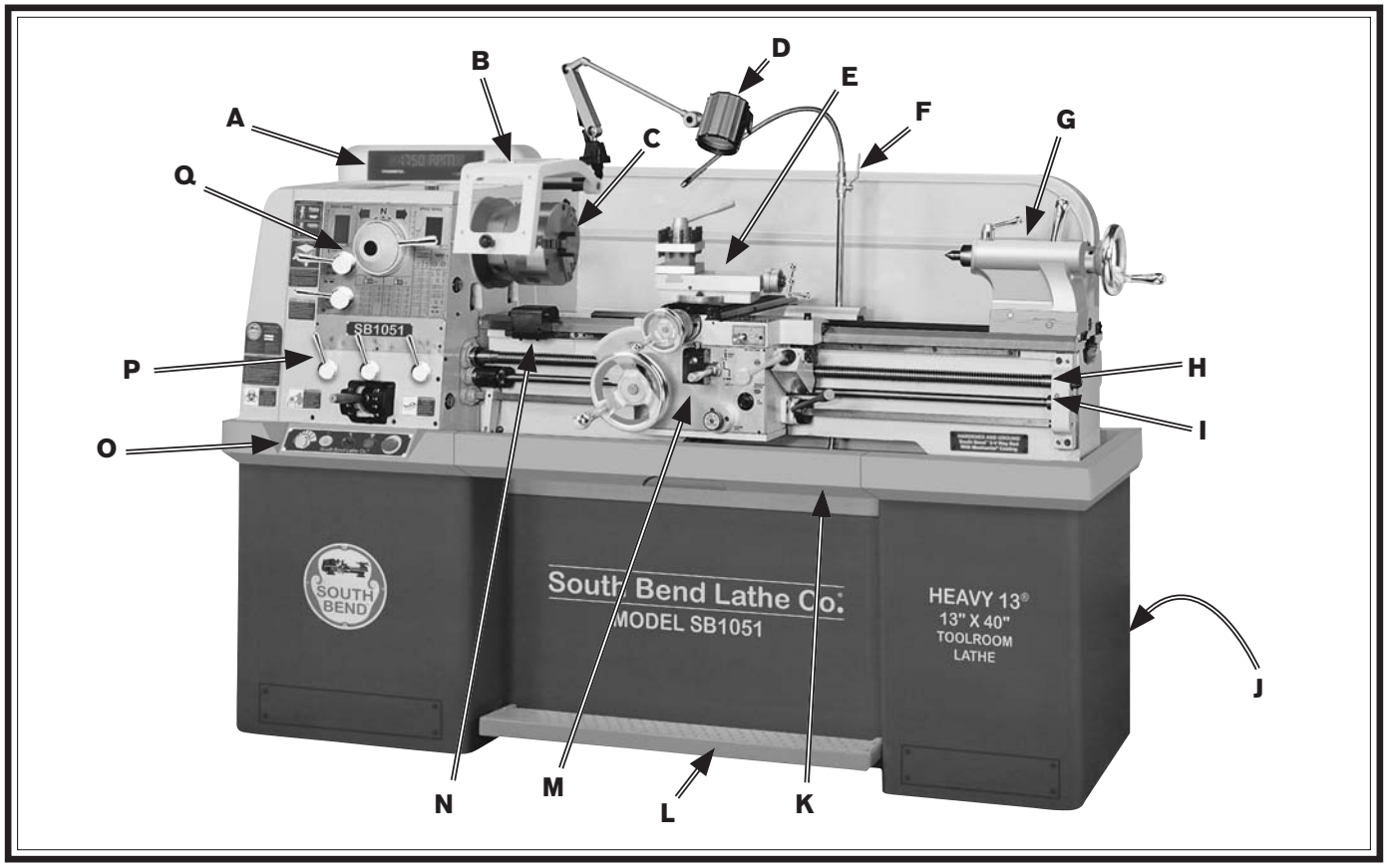


Figure 1. Identification.

A. Spindle Speed Digital Readout
B. Chuck Guard w/Safety Switch
C. 3-Jaw Chuck (7") w/2-Piece Jaws
D. Halogen Work Light
E. Compound Rest w/4-Way Tool Post
F. Coolant Nozzle & Control Valve
G. Tailstock
H. Longitudinal Leadscrew
I. Feed Rod
J. Coolant Pump & Tank Access
K. Slide-Out Chip Tray
L. Safety Brake Pedal
M. Carriage (see **Page 6** for details)
N. Micrometer Stop
O. Control Panel (see **Page 6** for details)
P. Quick-Change Gearbox Controls (see **Page 5** for details)
Q. Headstock Controls (see **Page 5** for details)

⚠WARNING

Serious personal injury could occur if you connect the machine to power before completing the setup process. DO NOT connect power until instructed to do so later in this manual.

⚠WARNING

Untrained users have an increased risk of seriously injuring themselves with this machine. Do not operate this machine until you have understood this entire manual and received proper training.

Basic Controls

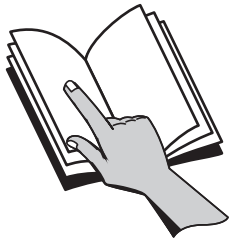
Refer to **Figures 2–7** and the following descriptions to become familiar with the basic controls of this lathe.

Many of the controls will be explained in greater depth later in this manual.

Master Power Switch

The rotary switch shown in **Figure 2** toggles incoming power ON and OFF to the lathe controls. As a safety feature, it also prevents the electrical cabinet door from being opened when the switch is ***ON***.

Figure 2. Master power switch located on electrical cabinet door.



⚠WARNING

To reduce the risk of serious injury when using this machine, read and understand this entire manual before beginning any operations.

Headstock & Quick-Change Gearbox

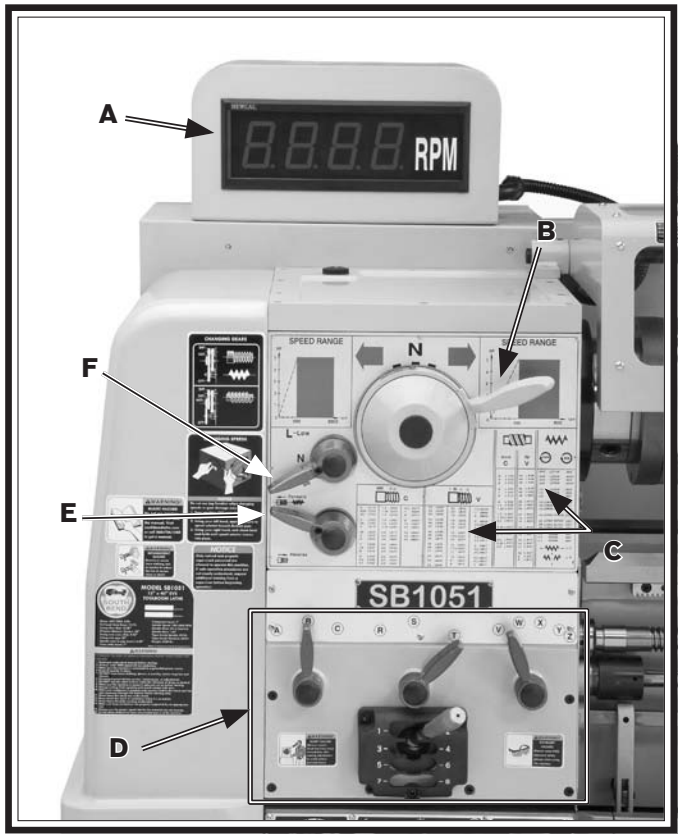


Figure 3. Headstock and quick-change gearbox controls.

A. Spindle Speed Digital Readout: Displays the spindle speed in RPM's.

B. Spindle Speed Range Lever: Selects the high or low range of spindle speeds to be active.

C. Thread & Feed Rate Charts: Display the arrangements of the feed range lever and the quick-change gearbox controls for threading and power feed operations.

D. Quick-Change Gearbox Levers: Control the leadscrew and feed rod speed for threading and feed operations.

E. Headstock Feed Direction Lever: Controls the direction that the leadscrew and feed rod rotate. The spindle must be completely stopped before using this control.

F. Feed Range Lever: Shifts the quick-change gearbox into low range, neutral, or high range.

Control Panel

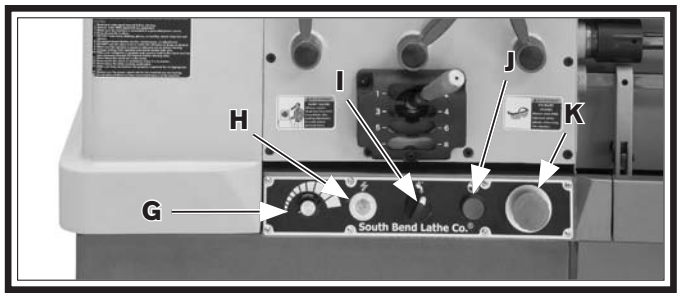


Figure 4. Control panel.

G. Spindle Speed Dial: Controls the spindle speed within the range selected by the spindle speed range lever.

H. Power Light: Illuminates when lathe controls are receiving power.

I. Coolant Pump Switch: Controls the coolant pump motor.

J. Jog Button: Rotates spindle forward while it is pressed.

K. STOP Button: Stops all machine functions. Twist clockwise to reset.

Carriage

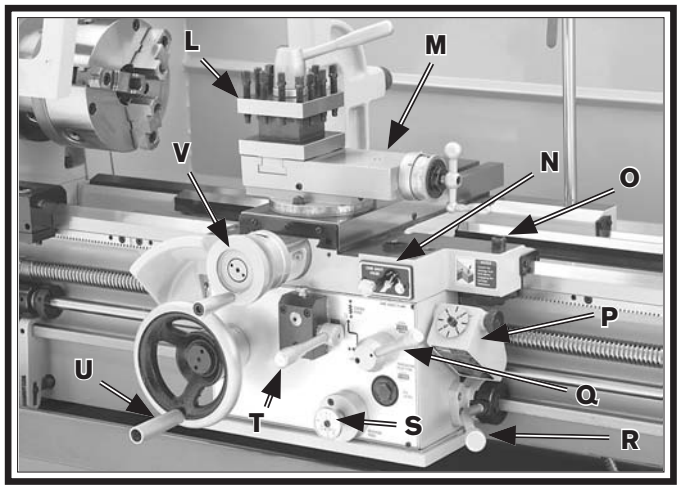


Figure 5. Carriage controls.

L. 4-Way Tool Post: Mounts up to four cutting tools at once that can be individually indexed to the workpiece.

M. Compound Rest Handwheel: Moves the tool toward and away from the workpiece at the preset angle of the compound rest.

N. One-Shot Oiler: Draws oil from the apron reservoir to lubricate the carriage ways through various oil ports.

O. Carriage Lock: Secures the carriage in place to ensure accuracy during operations where it should not move.

P. Thread Dial and Chart: Dial indicates when to engage the half nut during inch threading operations. Chart indicates on which thread dial reading to engage the half nut for specific thread pitches.

Q. Half Nut Lever: Engages/disengages the half nut for threading operations.

R. Spindle Lever: Starts and stops spindle rotation in either direction.

S. Apron Feed Direction Knob: Changes direction of the carriage or the cross slide feed without having to stop the lathe and move the headstock feed direction lever.

T. Feed Selection Lever: Selects the carriage or cross slide for power feed operations.

U. Carriage Handwheel: Moves the carriage along the bed.

V. Cross Slide Handwheel: Moves the cross slide toward and away from the workpiece.

Tailstock

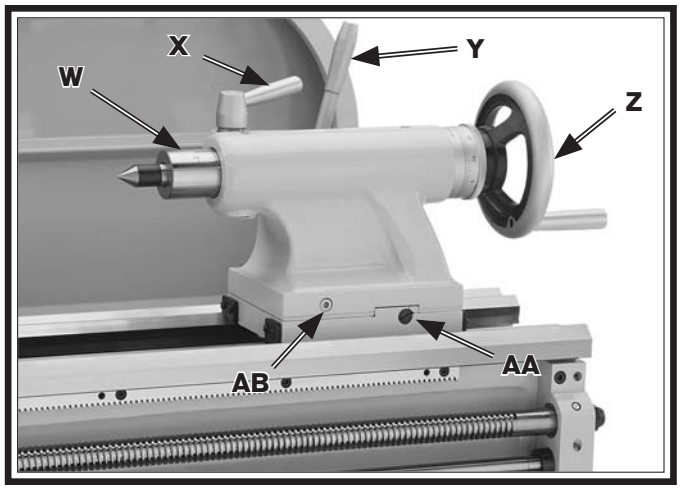


Figure 6. Tailstock controls.

W. Quill: Moves toward and away from the spindle and holds centers and tooling.

X. Quill Lock Lever: Secures the quill in position.

Y. Tailstock Lock Lever: Secures the tailstock in position along the bedway.

Z. Quill Handwheel: Moves the quill toward or away from the spindle.

AA. Gib Adjustment Screw: Adjusts the tapered gib to control tailstock offset accuracy (1 of 2).

AB. Tailstock Offset Screw: Adjusts the tailstock offset left or right from the spindle centerline (1 of 2).

Safety Brake Pedal

This lathe is equipped with a brake pedal (see **Figure 7**) to quickly stop the spindle instead of allowing it to coast to a stop on its own. Pushing the foot brake while the spindle is ***ON*** cuts power to the motor and stops the spindle.

After the foot brake is used, the spindle lever must be returned to the OFF (middle) position to reset the spindle switches before re-starting spindle rotation.

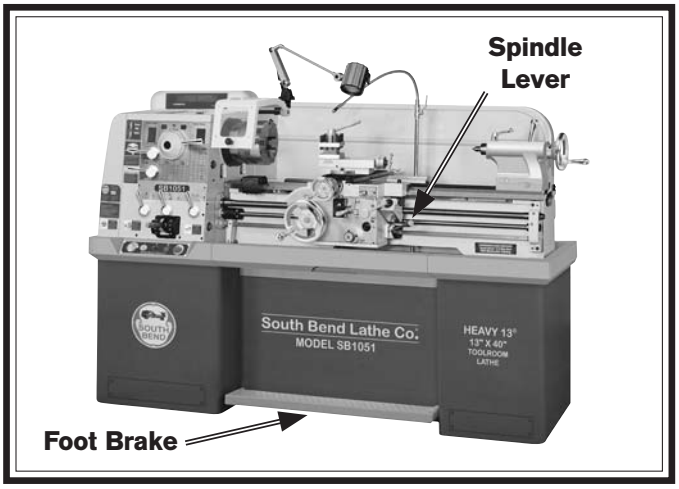


Figure 7. Foot brake and spindle lever.

SOUTH BEND®

Product Specifications

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SOUTH BEND®

Model SB1051
Heavy 13® 13" x 40" EVS Lathe

Product Dimensions

Weight..... 2420 lbs.
Width (side-to-side) x Depth (front-to-back) x Height..... 83-1/2 x 38-1/2 x 59 in.
Footprint (Length x Width)..... 80-3/4 x 19-1/2 in.

Shipping Dimensions

Type..... Wood Slat Crate
Content..... Machine
Weight..... 2684 lbs.
Length x Width x Height..... 90 x 45 x 69 in.

Electrical

Power Requirement..... 220V, 3-Phase, 60 Hz
Full-Load Current Rating..... 15.7A
Minimum Circuit Size..... 20A
Inverter Type..... Yaskawa G7A25P5
Switch..... Magnetic with Thermal Protection
Switch Voltage..... 220V
Plug Included..... No
Recommended Plug/Outlet Type..... NEMA 15-20

Motors

Main

Type..... TEFC Induction
Horsepower..... 5 HP
Voltage..... 220V
Phase..... 3-Phase
Amps..... 14A
Speed..... 0-4500 RPM
Cycle..... 0 – 150 Hz
Number of Speeds..... Variable
Power Transfer ..... V-Belt & Gear
Bearings..... Shielded and Permanently Sealed

Lubrication

Type	TEFC Induction
Horsepower	1/4 HP
Voltage	220V
Phase	3-Phase
Amps	1.4A
Speed	1725 RPM
Cycle	60 Hz
Number of Speeds	1
Power Transfer	Direct Drive
Bearings	Shielded and Permanently Sealed

Coolant

Type	TEFC Induction
Horsepower	1/8 HP
Voltage	220V
Phase	3-Phase
Amps	0.3A
Speed	3450 RPM
Cycle	60 Hz
Number of Speeds	1
Power Transfer	Direct Drive
Bearings	Shielded and Permanently Sealed

Main Specifications

Operation Info

Swing Over Bed	13.38 in.
Distance Between Centers	40 in.
Swing Over Cross Slide	8.26 in.
Swing Over Saddle	11.02 in.
Swing Over Gap	20 in.
Maximum Tool Bit Size	3/4 in.
Compound Travel	4 in.
Carriage Travel	36.5 in.
Cross Slide Travel	7 in.

Headstock Info

Spindle Bore	1.65 in.
Spindle Taper	MT#5
Number of Spindle Speeds	Variable
Spindle Speeds	100 – 3000 RPM
Spindle Type	D1-5
Spindle Bearings	NSK or NTN Tapered Roller
Spindle Length	21.13 in.
Spindle Length with 3-Jaw Chuck	29 in.
Spindle Length with 4-Jaw Chuck	31 in
Spindle Nose to Gap	6.46 in.

Tailstock Info

Tailstock Quill Travel	4.5 in.
Tailstock Taper	MT#3
Tailstock Barrel Diameter	1.968 in.

Threading Info

Number of Longitudinal Feeds	17
Range of Longitudinal Feeds	0.002 – 0.067 in./rev.
Number of Cross Feeds	17
Range of Cross Feeds	0.001 – 0.034 in./rev.
Number of Inch Threads	45
Range of Inch Threads	2 - 72 TPI
Number of Metric Threads	39
Range of Metric Threads	0.2 – 14 mm
Number of Modular Pitches	18
Range of Modular Pitches	0.3 – 3.5 MP
Number of Diametral Pitches	21
Range of Diametral Pitches	8 - 44 DP

Dimensions

Bed Width	9 in.
Leadscrew Diameter	1-1/8 in.
Leadscrew TPI	4 TPI
Leadscrew Length	59 in.
Steady Rest Capacity	5/16 – 4-5/16 in.
Follow Rest Capacity	5/8 – 3-1/8 in.
Faceplate Size	10 in.
Feed Rod Diameter	3/4 in
Floor to Center Height	42.2 in
Height With Leveling Jacks	59.06 in.

Construction

Base	Cast iron
Headstock	Cast Iron
Headstock Gears	Flame-Hardened Steel
Bed	Induction-Hardened and Ground Cast Iron
Body	Cast Iron
Stand	Cast Iron
Paint	Urethane

Other

Country Of Origin	Taiwan (Some Components Made in USA and Japan)
Warranty	1 Year
Serial Number Location	ID Label on Rear Side of Left Stand
Customer Assembly & Setup Time	2 Hours
Sound Rating	71 – 76 dB

Understanding Risks of Machinery

Operating all machinery and machining equipment can be dangerous or relatively safe depending on how it is installed and maintained, and the operator's experience, common sense, risk awareness, working conditions, and use of personal protective equipment (safety glasses, respirators, etc.).

The owner of this machinery or equipment is ultimately responsible for its safe use. This responsibility includes proper installation in a safe environment, personnel training and usage authorization, regular inspection and maintenance, manual availability and comprehension, application of safety devices, integrity of cutting tools or accessories, and the usage of approved personal protective equipment by all operators and bystanders.

The manufacturer of this machinery or equipment will not be held liable for injury or property damage from negligence, improper training, machine modifications, or misuse. Failure to read, understand, and follow the manual and safety labels may result in serious personal injury, including amputation, broken bones, electrocution, or death.

The signals used in this manual to identify hazard levels are as follows:

⚠DANGER	***Death or catastrophic harm WILL occur.***	**⚠CAUTION**	***Moderate injury or fire MAY occur.***
⚠WARNING	***Death or catastrophic harm COULD occur.***	***NOTICE***	***Machine or property damage may occur.***

Basic Machine Safety

Owner's Manual: All machinery and machining equipment presents serious injury hazards to untrained users. To reduce the risk of injury, anyone who uses THIS item MUST read and understand this entire manual before starting.

Personal Protective Equipment: Operating or servicing this item may expose the user to flying debris, dust, smoke, dangerous chemicals, or loud noises. These hazards can result in eye injury, blindness, long-term respiratory damage, poisoning, cancer, reproductive harm or hearing loss. Reduce your risks from these hazards by wearing approved eye protection, respirator, gloves, or hearing protection.

Trained/Supervised Operators Only: Untrained users can seriously injure themselves or bystanders. Only allow trained and properly supervised personnel to operate this item. Make sure safe operation instructions are clearly understood. If electrically powered, use padlocks and master switches, and remove start switch keys to prevent unauthorized use or accidental starting.

Guards/Covers: Accidental contact with moving parts during operation may cause severe entanglement, impact, cutting, or crushing injuries. Reduce this risk by keeping any included guards/covers/doors installed, fully functional, and positioned for maximum protection.

Entanglement: Loose clothing, gloves, neckties, jewelry or long hair may get caught in moving parts, causing entanglement, amputation, crushing, or strangulation. Reduce this risk by removing/securing these items so they cannot contact moving parts.

Mental Alertness: Operating this item with reduced mental alertness increases the risk of accidental injury. Do not let a temporary influence or distraction lead to a permanent disability! Never operate when under the influence of drugs/alcohol, when tired, or otherwise distracted.

Safe Environment: Operating electrically powered equipment in a wet environment may result in electrocution; operating near highly flammable materials may result in a fire or explosion. Only operate this item in a dry location that is free from flammable materials.

Electrical Connection: With electically powered equipment, improper connections to the power source may result in electrocution or fire. Always adhere to all electrical requirements and applicable codes when connecting to the power source. Have all work inspected by a qualified electrician to minimize risk.

Disconnect Power: Adjusting or servicing electrically powered equipment while it is connected to the power source greatly increases the risk of injury from accidental startup. Always disconnect power BEFORE any service or adjustments, including changing blades or other tooling.

Secure Workpiece/Tooling: Loose workpieces, cutting tools, or rotating spindles can become dangerous projectiles if not secured or if they hit another object during operation. Reduce the risk of this hazard by verifying that all fastening devices are properly secured and items attached to spindles have enough clearance to safely rotate.

Chuck Keys or Adjusting Tools: Tools used to adjust spindles, chucks, or any moving/ rotating parts will become dangerous projectiles if left in place when the machine is started. Reduce this risk by developing the habit of always removing these tools immediately after using them.

Work Area: Clutter and dark shadows increase the risks of accidental injury. Only operate this item in a clean, non-glaring, and well-lighted work area.

Properly Functioning Equipment: Poorly maintained, damaged, or malfunctioning equipment has higher risks of causing serious personal injury compared to those that are properly maintained. To reduce this risk, always maintain this item to the highest standards and promptly repair/service a damaged or malfunctioning component. Always follow the maintenance instructions included in this documentation.

Unattended Operation: Electrically powered equipment that is left unattended while running cannot be controlled and is dangerous to bystanders. Always turn the power ***OFF*** before walking away.

Health Hazards: Certain cutting fluids and lubricants, or dust/smoke created when cutting, may contain chemicals known to the State of California to cause cancer, respiratory problems, birth defects, or other reproductive harm. Minimize exposure to these chemicals by wearing approved personal protective equipment and operating in a well ventilated area.

Difficult Operations: Attempting difficult operations with which you are unfamiliar increases the risk of injury. If you experience difficulties performing the intended operation, STOP! Seek an alternative method to accomplish the same task, ask a qualified expert how the operation should be performed, or contact our Technical Support for assistance.

Additional Metal Lathe Safety

Speed Rates. Operating the lathe at the wrong speed can cause nearby parts to break or the workpiece to come loose, which will result in dangerous projectiles that could cause severe impact injuries. Large or non-concentric workpieces must be turned at slow speeds. Always use the appropriate feed and speed rates.

Chuck Key Safety. A chuck key left in the chuck can become a deadly projectile when the spindle is started. Always remove the chuck key after using it. Develop a habit of not taking your hand off of a chuck key unless it is away from the machine.

Safe Clearances. Workpieces that crash into other components on the lathe may throw dangerous projectiles in all directions, leading to impact injury and damaged equipment. Before starting the spindle, make sure the workpiece has adequate clearance by hand-rotating it through its entire range of motion. Also, check the tool and tool post clearance, chuck clearance, and saddle clearance.

Long Stock Safety. Long stock can whip violently if not properly supported, causing serious impact injury and damage to the lathe. Reduce this risk by supporting any stock that extends from the chuck/headstock more than three times its own diameter. Always turn long stock at slow speeds.

Securing Workpiece. An improperly secured workpiece can fly off the lathe spindle with deadly force, which can result in a severe impact injury. Make sure the workpiece is properly secured in the chuck or faceplate before starting the lathe.

Chucks. Chucks are very heavy and difficult to grasp, which can lead to crushed fingers or hands if mishandled. Get assistance when handling chucks to reduce this risk. Protect your hands and the precision-ground ways by using a chuck cradle or piece of plywood over the ways of the lathe when servicing chucks. Use lifting devices when necessary.

Clearing Chips. Metal chips can easily cut bare skin—even through a piece of cloth. Avoid clearing chips by hand or with a rag. Use a brush or vacuum to clear metal chips.

Stopping Spindle by Hand. Stopping the spindle by putting your hand on the workpiece or chuck creates an extreme risk of entanglement, impact, crushing, friction, or cutting hazards. Never attempt to slow or stop the lathe spindle with your hand. Allow the spindle to come to a stop on its own or use the brake.

Crashes. Aggressively driving the cutting tool or other lathe components into the chuck may cause an explosion of metal fragments, which can result in severe impact injuries and major damage to the lathe. Reduce this risk by releasing automatic feeds after use, not leaving lathe unattended during operations, and checking clearances before starting the lathe. Make sure no part of the tool, tool holder, compound rest, cross slide, or carriage will contact the chuck during operation.

Coolant Safety. Coolant is a very poisonous biohazard that can cause personal injury from skin contact alone, especially when it gets old or has been well-used. Incorrectly positioned coolant nozzles can splash on the operator or the floor, resulting in skin exposure or a slipping hazard. To decrease your risk, change coolant regularly and position the nozzle where it will not splash or end up on the floor.

Tool Selection. Cutting with an incorrect or dull tool increases the risk of accidental injury due to the extra force required for the operation, which increases the risk of breaking or dislodging components that can cause small shards of metal to become dangerous projectiles. Always select the right cutter for the job and make sure it is sharp. Using a correct, sharp tool decreases strain and provides a better finish.

Additional Chuck Safety

Entanglement. Entanglement with a rotating chuck can lead to death, amputation, broken bones, or other serious injury. Never attempt to slow or stop the lathe chuck by hand, and always roll up long sleeves, tie back long hair, and remove any jewelry or loose apparel BEFORE operating.

Chuck Speed Rating. Excessive spindle speeds greatly increase the risk of the workpiece or chuck being thrown from the machine with deadly force. Never use spindle speeds faster than the chuck RPM rating or the safe limits of your workpiece.

Using Correct Equipment. Many workpieces can only be safely turned in a lathe if additional support equipment, such as a tailstock or steady rest, is used. If the operation is too hazardous to be completed with the lathe or existing equipment, the operator must have enough experience to know when to use a different machine or find a safer way. If you do not have this experience, seek additional training (outside of this manual) from experienced lathe operators, books, or formal classes.

Trained Operators Only. Using a chuck incorrectly can result in workpieces coming loose at high speeds and striking the operator or bystanders with deadly force. To reduce the risk of this hazard, read and understand this document and seek additional training from an experienced chuck user before using a chuck.

Chuck Capacity. Avoid exceeding the capacity of the chuck by clamping an oversized workpiece. If the workpiece is too large to safely clamp with the chuck, use a faceplate or a larger chuck if possible. Otherwise, the workpiece could be thrown from the lathe during operation, resulting in serious impact injury or death.

Clamping Force. Inadequate clamping force can lead to the workpiece being thrown from the chuck and striking the operator or bystanders. Maximum clamping force is achieved when the chuck is properly maintained and lubricated, all jaws are fully engaged with the workpiece, and the maximum chuck clamping diameter is not exceeded.

Proper Maintenance. All chucks must be properly maintained and lubricated to achieve maximum clamping force and withstand the rigors of centrifugal force. To reduce the risk of a thrown workpiece, follow all maintenance intervals and instructions in this document.

Disconnect Power. Serious entanglement or impact injuries could occur if the lathe is started while you are adjusting, servicing, or installing the chuck. Always disconnect the lathe from power before performing these procedures.

Preparation Overview

The purpose of the preparation section is to help you prepare your machine for operation. The list below outlines this basic process. Specific steps for each of these points will be covered in detail later in this section.

The typical preparation process is as follows:

1. Unpack the lathe and inventory the contents of the box/crate.
2. Clean the lathe and its components.
3. Identify an acceptable location for the lathe and move it to that location.
4. Level the lathe and either bolt it to the floor or place it on mounts.
5. Assemble the loose components and make any necessary adjustments or inspections to ensure the lathe is ready for operation.
6. Check/lubricate the lathe.
7. Connect the lathe to the power source.
8. Test run the lathe to make sure it functions properly.
9. Perform the spindle break-in procedure to prepare the lathe for operation.

Things You'll Need

To complete the preparation process, you will need the following items:

For Lifting and Moving

- A forklift or other power lifting device rated for at least 25% more than the shipping weight of the lathe (see **Product Specifications** beginning on **Page 8**)
- Lifting straps, each rated for at least 25% more than the shipping weight of the lathe
- Guide rods for steadying the load when lifting
- Two other people for assistance when moving the machine
- Hardwood blocking (see **Page 21**)

For Power Connection

- A power source that meets the minimum circuit requirements for this machine (review **Power Supply Requirements** on the next page for details)
- An electrician or qualified service personnel to ensure a safe and code-compliant connection to the power source

For Cleaning & Assembly

- Cotton rags
- Mineral spirits
- Quality metal protectant oil
- Safety glasses
- Wrench or socket 21mm
- Wrench or socket 19mm
- Floor mounting hardware as needed
- Precision level
- Standard screwdriver #2

Power Supply Requirements

Availability

Before installing the machine, consider the availability and proximity of the required power supply circuit. If an existing circuit does not meet the requirements for this machine, a new circuit must be installed.

To minimize the risk of electrocution, fire, or equipment damage, installation work and electrical wiring must be done by an electrician or qualified service personnel in accordance with all applicable codes.

⚠WARNING

Serious injury could occur if you connect the machine to power before completing the setup process. DO NOT connect to power until instructed later in this manual.

Full-Load Current Rating

The full-load current rating is the amperage a machine draws at 100% of the rated output power. On machines with multiple motors, this is the amperage drawn by the largest motor or sum of all motors and electrical devices that might operate at one time during normal operations.

Full-Load Rating..... 15.7 Amps

⚠CAUTION

For your own safety and protection of property, consult an electrician if you are unsure about wiring practices or applicable electrical codes.

The full-load current is not the maximum amount of amps that the machine will draw. If the machine is overloaded, it will draw additional amps beyond the full-load rating.

If the machine is overloaded for a sufficient length of time, damage, overheating, or fire may result—especially if connected to an undersized circuit. To reduce the risk of these hazards, avoid overloading the machine during operation and make sure it is connected to a power supply circuit that meets the requirements in the following section.

Circuit Requirements

This machine is prewired to operate on a 220V power supply circuit that has a verified ground and meets the following requirements:

Nominal Voltage 220V/240V
Cycle ..... 60 Hz
Phase 3-Phase
Circuit Rating..... 20 Amps
Cord ....."S" Type, 4-Wire, 12 AWG, 300 VAC
Plug/Receptacle ..... NEMA 15-20

A power supply circuit includes all electrical equipment between the main breaker box or fuse panel in your building and the incoming power connections inside the machine. This circuit must be safely sized to handle the full-load current that may be drawn from the machine for an extended period of time. (If this machine is connected to a circuit protected by fuses, use a time delay fuse marked D.)

Note: The circuit requirements in this manual are for a dedicated circuit—where only one machine will be running at a time. If this machine will be connected to a shared circuit where multiple machines will be running at the same time, consult a qualified electrician to ensure the circuit is properly sized.

Grounding Requirements

This machine must be grounded! In the event of certain types of malfunctions or breakdowns, grounding provides a path of least resistance for electric current in order to reduce the risk of electric shock.

Improper connection of the equipment-grounding wire can result in a risk of electric shock. The wire with green insulation (with or without yellow stripes) is the equipment-grounding wire. If repair or replacement of the power cord is necessary, do not connect the equipment-grounding wire to a live (current carrying) terminal.

Check with an electrician or qualified service personnel if you do not understand these grounding requirements, or if you are in doubt about whether the machine is properly grounded. If you ever notice that a cord is damaged or worn, disconnect it from power, and immediately replace it with a new one.

The power cord and plug specified under **Circuit Requirements** section on the previous page has an equipment-grounding wire and a grounding prong. The plug must only be inserted into a matching receptacle (outlet) that is properly installed and grounded in accordance with all local codes and ordinances (see **Figure 8**).

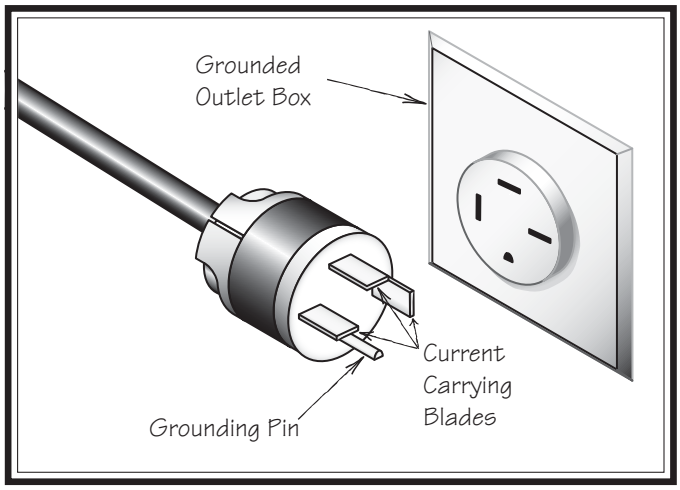


Figure 8. Typical NEMA 15-20 plug and receptacle.

Extension Cords

We do not recommend using an extension cord with this machine. If you must use an extension cord, only use it if absolutely necessary and only on a temporary basis.

Extension cords cause voltage drop, which may damage electrical components and shorten motor life. Voltage drop increases as the extension cord size gets longer and the gauge size get smaller (higher gauge numbers indicate smaller sizes).

Any extension cord used with this machine must contain a ground wire, match the required plug and receptacle, and meet the following requirements:

Minimum Gauge Size.....12 AWG
Maximum Length (Shorter is Better) ....50 ft.

Phase Converter

DO NOT use a static phase converter to create 3-phase power—it can quickly decrease the life of electrical components on this machine. If you must use a phase converter, only use a rotary phase converter and connect the manufactured leg to the **3L2** terminal of the master power switch (refer to the **Upper Electrical Cabinet Wiring Diagram** on **Page 91**).

Unpacking

This item was carefully packaged to prevent damage during transport. If you discover any damage, please immediately call Customer Service at (360) 734-1540 for advice. You may need to file a freight claim, so save the containers and all packing materials for possible inspection by the carrier or its agent.

Inventory

Main Inventory 1: (Figure 9)		Qty
A.	Steady Rest Assembly (Installed)	1
B.	10" Faceplate w/D1-5 Camlock Stud Set	1
C.	8" 4-Jaw Chuck w/Combo Jaws (SB1226)	1
D.	3-Jaw Chuck Key	1
E.	4-Jaw Chuck Key	1
F.	Follow Rest Assembly (Installed)	1

Tool Box Inventory: (Figure 10)		Qty
G.	Tool Box	1
H.	Open End Wrench 22/24mm	1
I.	Open End Wrench 14/17mm	1
J.	Open End Wrench 10/12mm	1
K.	Phillips Screwdriver #2	1
L.	Standard Screwdriver #2	1
M.	Hex Wrench 8mm	1
N.	Carbide-Tipped Dead Center MT#3	1
O.	Tapered Spindle Sleeve MT#5-#3	1
P.	Dead Center MT#3	1
Q.	Camlock Key D1-5	1
R.	Tool Post T-Wrench (Clamped on Tool Post)	1
S.	Hex Wrench 10 Pc. Set 1.5-10mm	1
T.	Carriage Handwheel Handle	1
U.	Cross Slide Handwheel Handle	1
V.	Cast Iron Leveling Pads	6

Installed & Not Shown	Qty
• 7" 3-Jaw Chuck w/Combo Jaws (SB1308)	1
• 8¼" Back Plate D1-5 (SB1399)	1

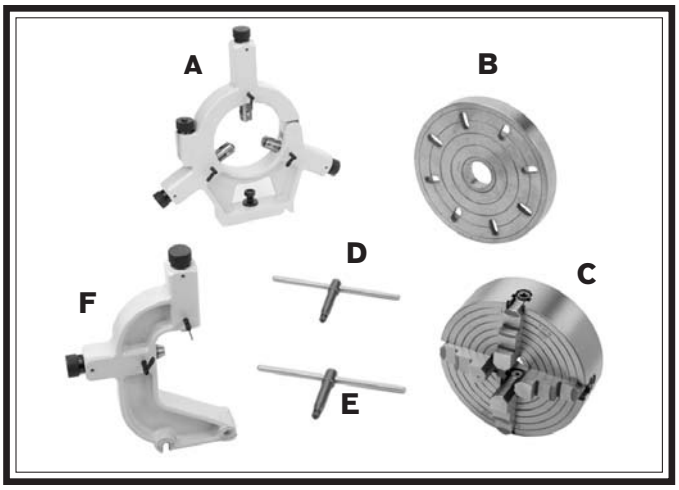


Figure 9. Main inventory.

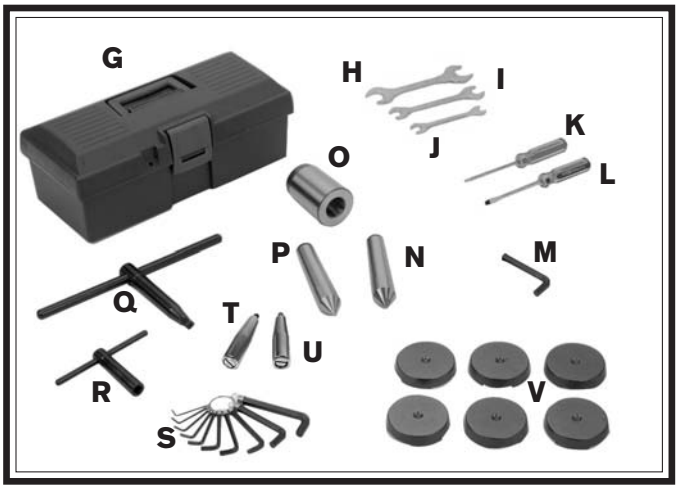


Figure 10. Toolbox inventory.

NOTICE

Some inventory components may be shipped inside the lathe electrical box or attached to the tool post. Inventory items in the electrical box MUST be removed before connecting the lathe to the power source.

Cleaning & Protecting

The unpainted surfaces are coated at the factory with a heavy-duty rust preventative that prevents corrosion during shipment and storage. The benefit of this rust preventative is that it works very well. The downside is that it can be time-consuming to thoroughly remove.

Be patient and do a careful job when cleaning and removing the rust preventative. The time you spend doing this will reward you with smooth-sliding parts and a better appreciation for the proper care of the unpainted surfaces.

Although there are many ways to successfully remove the rust preventative, the following process works well in most situations.

Before cleaning, gather the following:

- Disposable rags
- Cleaner/degreaser (certain citrus-based degreasers work extremely well and they have non-toxic fumes)
- Safety glasses & disposable gloves

Note: Automotive degreasers, mineral spirits, or WD•40 can be used to remove rust preventative. Before using these products, though, test them on an inconspicuous area of a painted surface to make sure they will not damage it.

⚠WARNING

Gasoline and petroleum products have low flash points and can explode or cause fire if used for cleaning. Avoid using these products to remove rust preventative.

⚠CAUTION

Many cleaning solvents are toxic if inhaled. Minimize your risk by only using these products in a well ventilated area.

NOTICE

Avoid chlorine-based solvents, such as acetone or brake parts cleaner that may damage painted surfaces. Always follow the manufacturer's instructions when using any type of cleaning product.

Basic steps for removing rust preventative:

1. Put on safety glasses and disposable gloves.

2. Coat all surfaces that have rust preventative with a liberal amount of your cleaner or degreaser and let them soak for a few minutes.

3. Wipe off the surfaces. If your cleaner or degreaser is effective, the rust preventative will wipe off easily.

Note: To clean off thick coats of rust preventative on flat surfaces, such as beds or tables, use a PLASTIC paint scraper to scrape off the majority of the coating before wiping it off with your rag. (Do not use a metal scraper or it may scratch the surface.)

4. Repeat **Steps 2–3** as necessary until clean, then coat all unpainted surfaces with a quality metal protectant or light oil to prevent rust.

NOTICE

Remove the end gear cover and end gears, and use a stiff brush with mineral spirits to clean the rust preventative from the gears and shafts. DO NOT get any cleaner or rust preventative on the V-belts, as it could damage them or make them slip during operations. If the belts do become contaminated, replace them (see Page 77).

Location

Physical Environment

The physical environment where your machine is operated is important for safe operation and longevity of parts. For best results, operate this machine in a dry environment that is free from excessive moisture, hazardous or flammable chemicals, airborne abrasives, or extreme conditions. Extreme conditions for this type of machinery are generally those where the ambient temperature is outside the range of 41°–104°F; the relative humidity is outside the range of 20–95% (non-condensing); or the environment is subject to vibration, shocks, or bumps.

Electrical Installation

Place this machine near an existing power source that meets the minimum circuit requirements. Make sure all power cords are protected from traffic, material handling, moisture, chemicals, or other hazards. Leave access to disconnect the power source or engage a lockout/tagout device.

Lighting

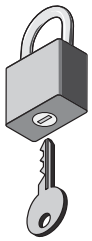
Lighting around the machine must be adequate enough that operations can be performed safely. Shadows, glare, or strobe effects that may distract or impede the operator must be eliminated.

Weight Load

Refer to the **Machine Specifications** for the weight of your machine. Make sure that the surface upon which the machine is placed will bear the weight of the machine, additional equipment that may be installed on the machine, and the heaviest workpiece that will be used. Additionally, consider the weight of the operator and any dynamic loading that may occur when operating the machine.

Space Allocation

Consider the largest size of workpiece that will be processed through this machine and provide enough space around the machine for adequate operator material handling or the installation of auxiliary equipment. With permanent installations, leave enough space around the machine to open or remove doors/covers as required by the maintenance and service described in this manual.



⚠CAUTION

Children or untrained people may be seriously injured by this machine. Install machine in an access restricted location.

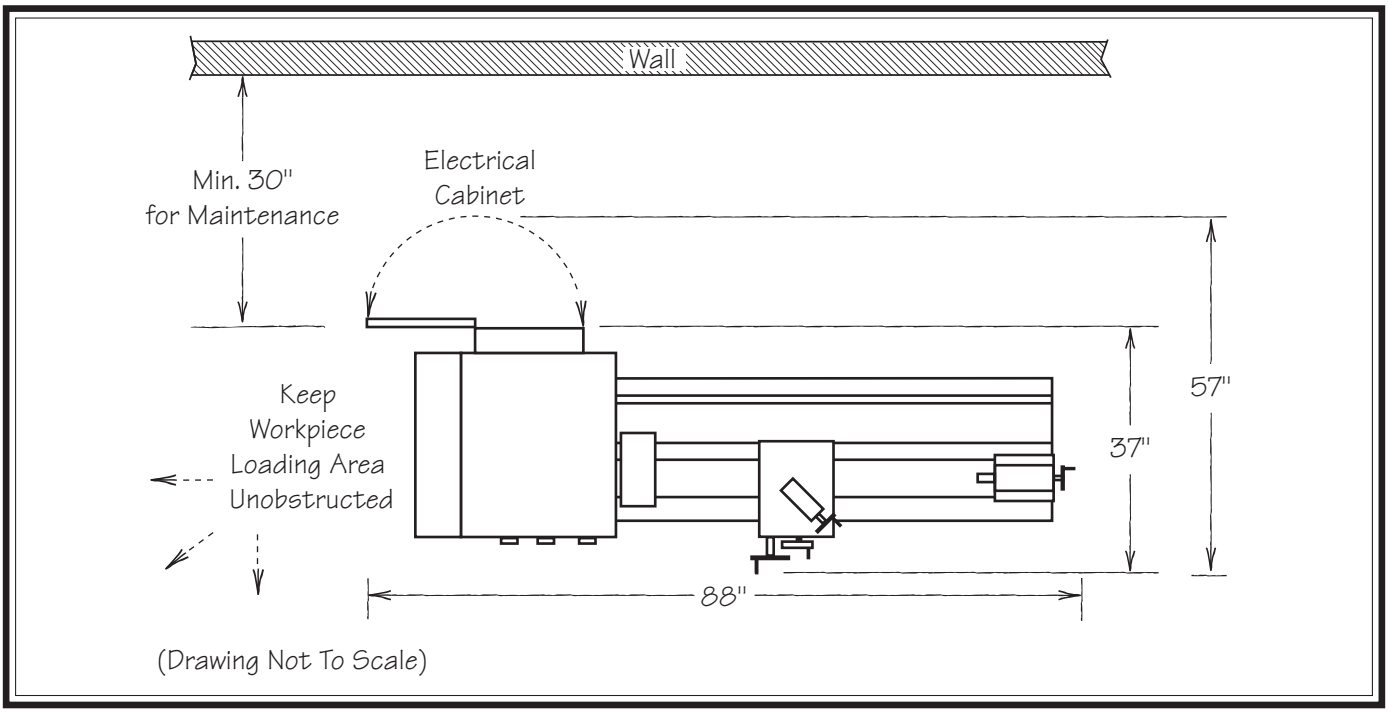
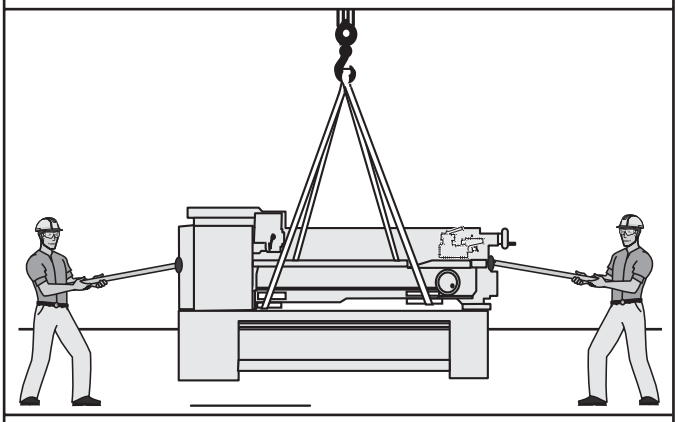


Figure 11. Space required for full range of movement.

Lifting & Moving

⚠WARNING



This machine and its parts are heavy! Serious personal injury may occur if safe moving methods are not used. To reduce the risk of a lifting or dropping injury, ask others for help, and use power equipment and guide rods.

Do not attempt to lift or move this lathe without using the proper lifting equipment (such as forklift or crane) or the necessary assistance from other people. Each piece of lifting equipment must be rated for at least 25% more than the shipping weight of your lathe to support dynamic loads that may be applied while lifting. Refer to **Things You'll Need** on **Page 15** for details.

To lift and move the lathe:

1. Remove the shipping crate top and sides, then remove the small components from the shipping pallet.

2. Move the lathe to its prepared location while it is still attached to the shipping pallet.

3. Unbolt the lathe from the shipping pallet

4. To balance the load for lifting, move the tailstock and carriage to the extreme right end of the bedway, then lock them in place.

Note: Before attempting to move the carriage, make sure the carriage lock is loose, the half nut is disengaged, and the power feed is disengaged (feed selection lever).

5. Position hardwood blocking under each end of the bed, as shown in **Figure 12**. This will keep the lifting straps away from the leadscrew, feed rod, and spindle rod to prevent bending them during lifting.

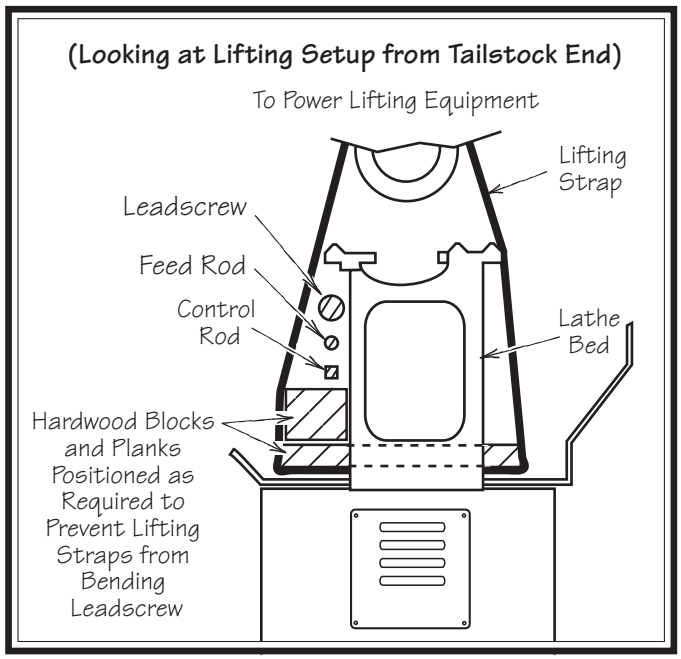

(Looking at Lifting Setup from Tailstock End)
To Power Lifting Equipment
Lifting Strap
Leadscrew
Feed Rod
Control Rod
Lathe Bed
Hardwood Blocks and Planks Positioned as Required to Prevent Lifting Straps from Bending Leadscrew

Figure 12. Lifting setup to keep straps from bending leadscrew or rods.

Note: Fasten a center support between the hardwood blocking so that they will stay spread apart and in place when lifting (see the example in **Figure 13**).

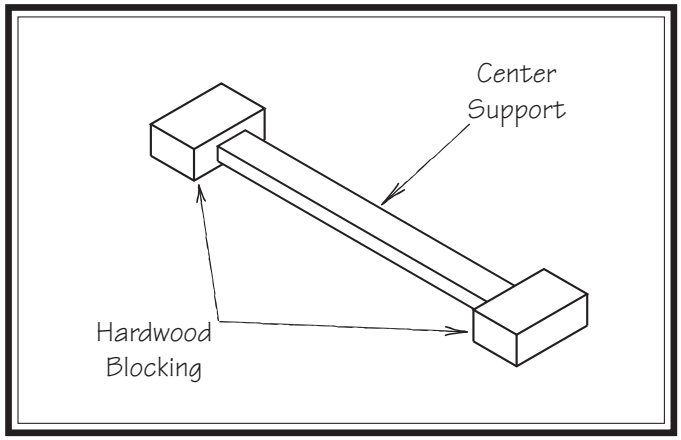


Figure 13. Example of blocking center support.

6. Attach the lifting straps to the power lifting equipment (see **Figure 14** for an example).

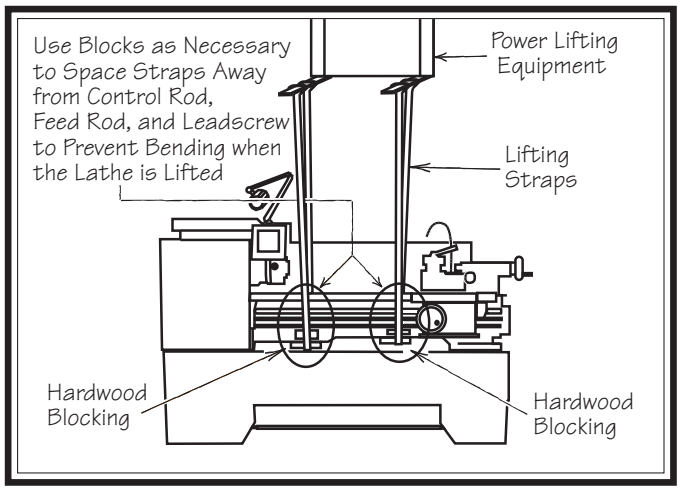

Use Blocks as Necessary to Space Straps Away from Control Rod, Feed Rod, and Leadscrew to Prevent Bending when the Lathe is Lifted
Power Lifting Equipment
Lifting Straps
Hardwood Blocking
Hardwood Blocking

Figure 14. Example of lathe setup for lifting.

7. At each end of the lathe, have assistants connect guide rods to safely keep the lathe from swaying or tipping during lifting.

NOTICE

When lifting the lathe with straps, the load will be top heavy. Take extra care to keep the load balanced vertically and only lift it far enough to remove the shipping pallet.

8. Raise the lathe a couple of inches and check the balance of the load.

— If the load is not safely balanced, immediately lower the lathe and resolve the issue before attempting to lift it again.

9. Raise the lathe enough to clear the shipping pallet, carefully remove the pallet, then lower the lathe into position.

Leveling & Mounting

You must level your machine and either use the included foot pads and leveling hardware or bolt and shim your lathe to the floor. Because mounting your lathe to the floor with permanent hardware is an optional step and floor materials may vary, floor mounting hardware is not included.

Leveling

NOTICE

For accurate turning results and to prevent warping the cast iron bed and ways, the lathe bedways MUST be leveled from side-to-side and from front-to-back on both ends.

Re-check the bedways 24 hours after installation, two weeks after that, and then annually to make sure they remain level.

Leveling machinery helps precision components, such as bedways, remain straight and flat during the lifespan of the machine. Components on a machine that is not level may slowly twist due to the dynamic loads placed on the machine during operation.

For best results, use a precision level that is at least 12" long and sensitive enough to show a distinct movement when a 0.003" shim (approximately the thickness of one sheet of standard newspaper) is placed under one end of the level.

See the figure below for an example of a high precision level.

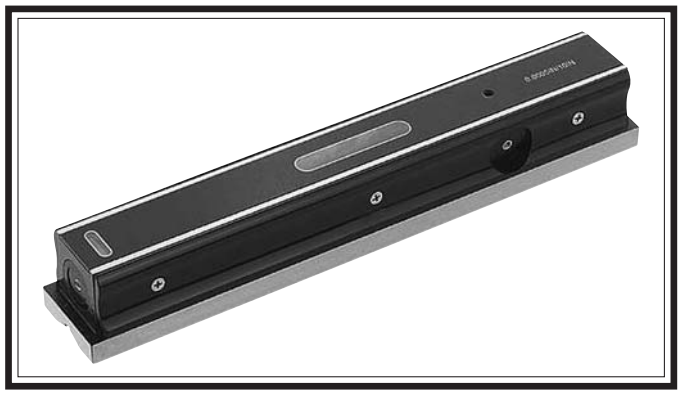


Figure 15. Example of a precision level.

To level the machine, use a precision level to make sure the bedways are level from side-to-side and from front-to-back.

— If using the included leveling pads (see **Figure 16**), place them under the six leveling jack bolt locations, then adjust the bolts to level the lathe.

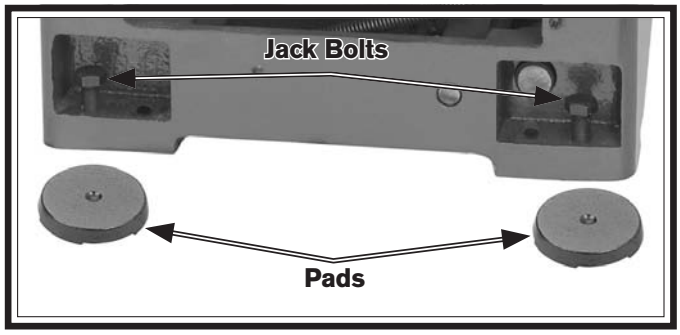


Figure 16. Leveling pads and screws.

— If using mounting hardware that does not allow for adjustment, level the lathe by placing metal shims between the lathe base and the floor before bolting it down.

Bolting to Concrete Floors

Lag screws and anchors, or anchor studs (**below**), are two popular methods for bolting machinery to a concrete floor. We suggest you research the many options and methods for mounting your machine and choose the best one for your specific application.

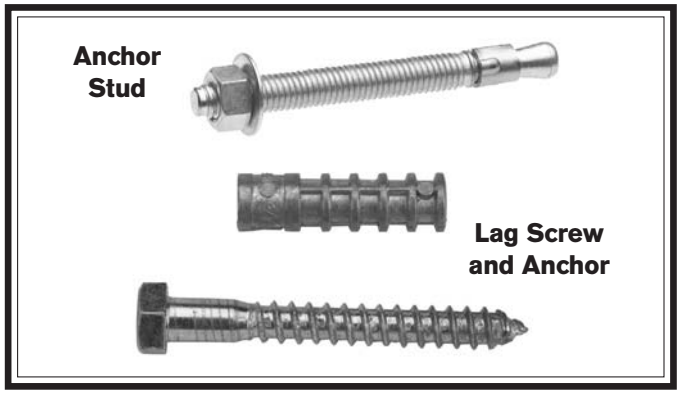


Figure 17. Common types of fasteners for bolting machinery to concrete floors.

NOTICE

Most electrical codes require that machines connected to the power source by fixed conduit MUST be secured to the floor.

Assembly

With the exception of the handwheel handles, the lathe is shipped fully assembled.

To install the handwheel handles, thread the large handle into the carriage handwheel and the small handle into the cross slide handwheel, as shown in **Figure 18**.

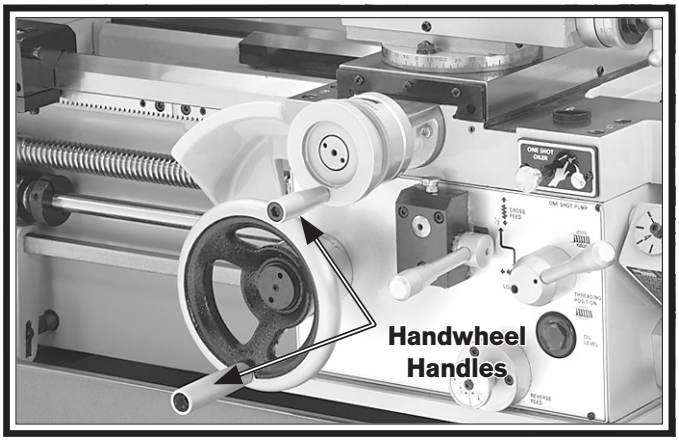


Figure 18. Handwheel handles installed.

Lubricating Lathe

The headstock, quick-change gearbox, and apron oil reservoirs must have the proper amount of oil in them before the lathe can be operated for the first time.

Damage caused by running the lathe without oil in the reservoirs is not be covered under warranty. Refer to the **Lubrication** section, beginning on **Page 64**, for details on how to check, add oil, and prime the headstock oil pump.

Besides adding oil to the reservoirs, we also recommend that you lubricate other points on the lathe at this time. This can be accomplished by following the **Lubrication** section beginning on **Page 64**.

Note: If this lathe was shipped with oil in the reservoirs, you can wait until after the test run and spindle break-in procedures to change the oil.

Adding Coolant

Add the coolant of your choice now. For detailed instructions on where the coolant tank is located and how to add fluid, refer to **Coolant System Service** on **Page 71**.

Power Connection

⚠WARNING

Electrocution or fire may occur if machine is ungrounded, incorrectly connected to power, or connected to an undersized circuit. Use an electrician or a qualified service personnel to ensure a safe power connection.

Once your machine is set up and assembled as previously described in this manual, it is ready to be connected to the power source.

To connect power cord to the lathe:

1. MAKE SURE POWER CORD IS NOT YET CONNECTED TO POWER!

2. Make sure the master power switch is turned to the OFF position, then open the electrical cabinet door.

3. Thread the power cord through the strain relief and up to the master power switch shown in **Figure 19**.

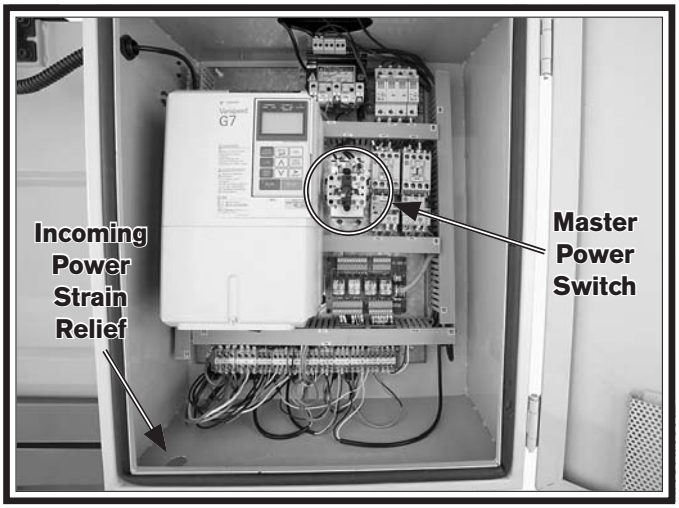


Figure 19. Location to connect power inside main electrical cabinet.

Continued On Next Page

4. Connect the incoming ground wire to the ground terminal directly above the master power switch, as illustrated in **Figure 20**.

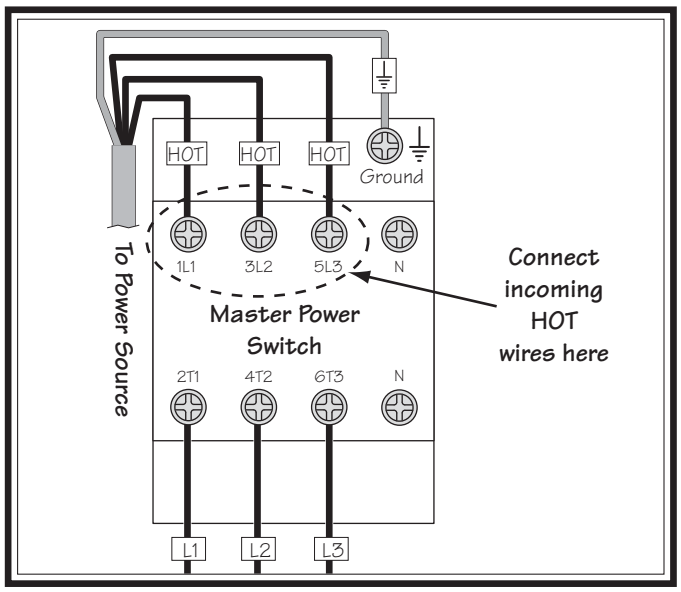


Figure 20. Power connection at master power switch.

5. Connect the incoming hot wires to the upper master power switch terminals

6. Make sure the power cord and wires have slack between the strain relief and terminal connections so that they do not bind, then tighten the strain relief to secure the cord.

Note: The strain relief must be tightened against the outer jacket of the cord. Avoid over-tightening the strain relief or it may crush the cord and cause a short.

7. Test the strain relief to ensure it is properly tightened by pulling the cord from outside the box with light-to-moderate force. When the strain relief is properly tightened, the cord will not move inside the cabinet.

8. Close and lock the main electrical cabinet door.

NOTICE

To avoid unexpected start-up of lathe components, keep the master power switch turned OFF until instructed otherwise in the Test Run.

Test Run

After all preparation steps have been completed, the machine and its safety features must be tested to ensure correct operation. If you discover a problem with the operation of the machine or its safety components, shut the machine down, disconnect it from power, and do not operate it until you have resolved the problem.

A **Troubleshooting** section is provided, starting on **Page 83**, to assist you with solutions if a problem occurs or if the lathe does not function as described in this section.

If you need additional help after reviewing the troubleshooting section, or you are not confident troubleshooting the machine on your own, contact our Tech Support at (360) 734-1540.

To test run your machine:

1. Make sure the master power switch (see **Figure 21**) on the rear of the machine is turned ***OFF***.

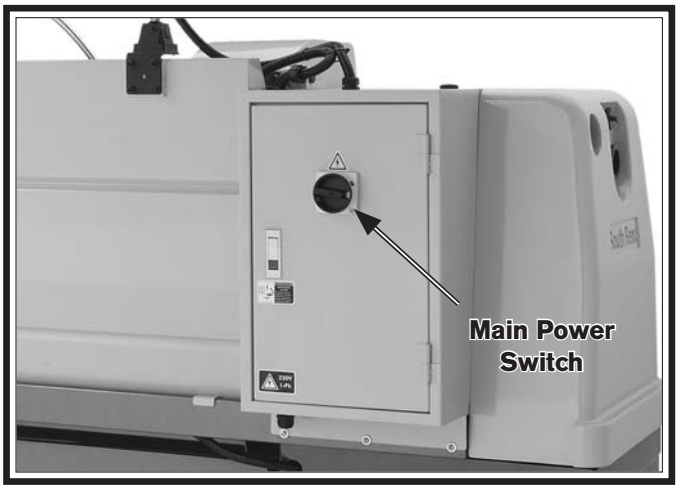


Figure 21. Location of the master power switch.

2. Read and follow the safety instructions at the beginning of the manual, take all required safety precautions, and make sure all previous preparation steps discussed in this manual have been followed and completed.

3. Clear away all tools and objects used during assembly, lubrication, and preparation.

4. Make sure that the chuck and jaws, if installed, are secure (refer to **Chuck and Faceplate Mounting** on **Page 31**).

Note: If a chuck is not installed on the lathe, you do not need to install one for this test.

5. Push the STOP button on the control panel (see **Figure 22**), and point the coolant nozzle into the chip pan.

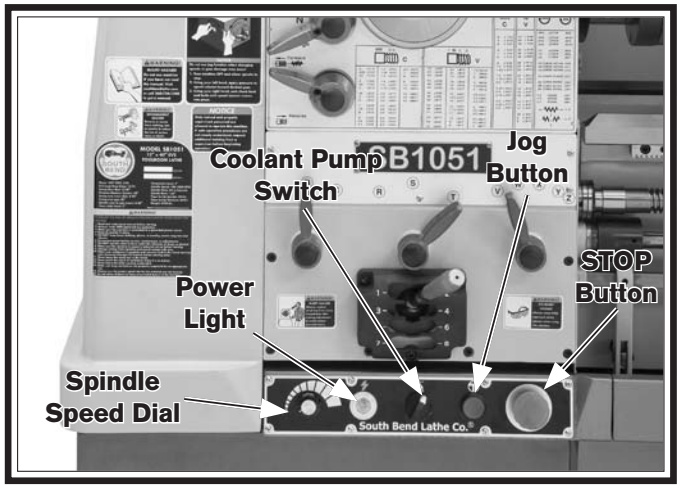


Figure 22. Control panel components.

6. Disengage the quick-change gearbox by moving the feed range lever to the neutral (middle) position, as shown in **Figure 23**.

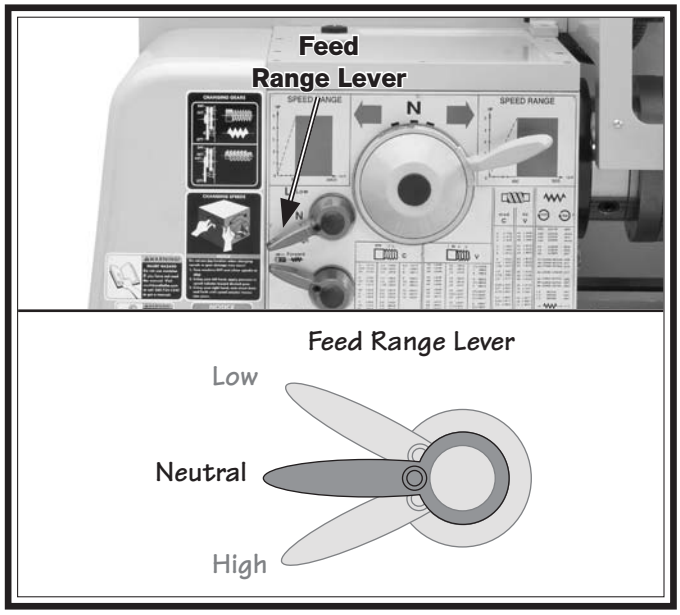


Figure 23. Feed range lever.

Note: During the next step, you may need to use the chuck key to rock the spindle back and forth, while attempting to shift, so the gears will mesh. If you do this, be sure to remove the chuck key afterward.

NOTICE

DO NOT use the jog button to help mesh the gears when changing spindle speeds or speed range! Doing so could damage the gears and connected components.

7. Move the spindle speed range lever so the arrow on the hub points to the right (see **Figure 24**). This will make the lower spindle speed range available.

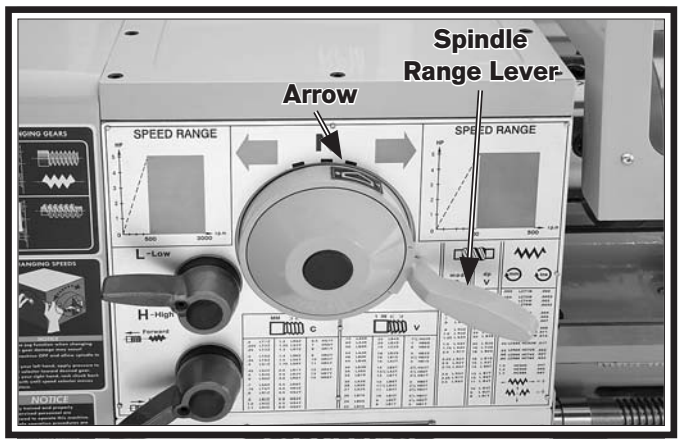


Figure 24. Low spindle speed range selected.

8. Rotate the spindle speed dial (see **Figure 22**) all the way counterclockwise to set it at the lowest speed for startup.

9. Turn the master power switch on the electrical cabinet to the ON position.

10. Reset the STOP button by twisting it clockwise until it pops out. The power lamp on the control panel should illuminate.

11. To ensure carriage components do not unexpectedly move during the following steps, disengage the half nut lever and feed selection lever (see **Figure 25**).

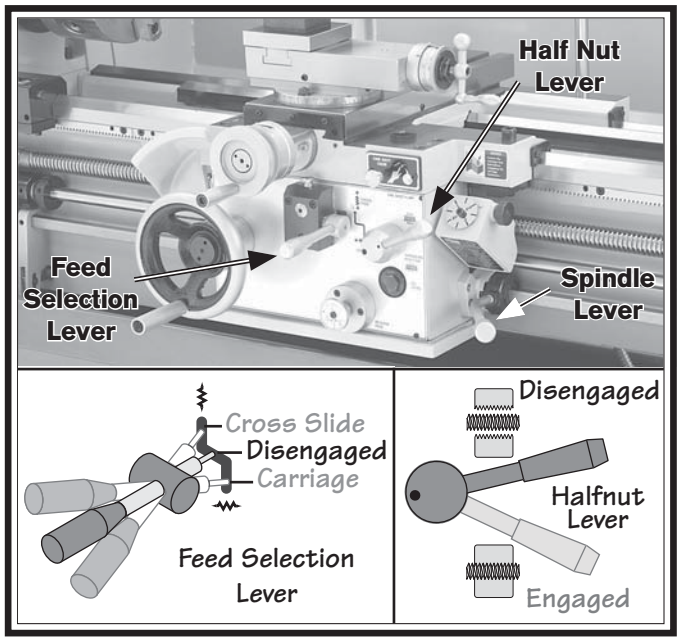


Figure 25. Disengaging carriage components.

12. Start the lathe by pulling the spindle lever out (see **Figure 25**) and moving it down.

— When operating correctly, the lathe runs smoothly with little or no vibration or rubbing noises.

— Investigate and correct strange or unusual noises or vibrations before operating any further. Always disconnect power before investigating or correcting potential problems.

13. Push the STOP button and turn the master power switch ***OFF***.

14. Press the STOP button to turn the lathe ***OFF***, then, without resetting the STOP button, try to restart spindle rotation—the spindle should *not* start.

— If spindle rotation *does* start with the STOP button pressed in, the STOP button safety is not operating correctly. This safety feature must operate properly before continuing operation. Use the spindle lever to stop the lathe, disconnect it from power, and call Tech Support for help.

15. Move the spindle lever to the OFF (middle) position, reset the STOP button by twisting it clockwise until it pops out, then restart spindle rotation.

16. Push the foot brake. The spindle should come to a quick stop.

— If the brake pedal has no effect on the lathe, push the STOP button, and refer to **Brake & Switch** on **Page 78** to make any required adjustments.

17. Move the spindle lever to the OFF (middle) position. Remove the end gear cover from the left side of the headstock. This activates a safety switch that should prevent the spindle from starting while the cover is removed.

18. Stand away from all the exposed gears on the side of the headstock, and attempt to start spindle rotation—the spindle should *not* start.

— If spindle rotation *does* start with the end gear cover removed, the safety switch is not operating correctly. This safety feature must operate properly before continuing operation. Press the STOP button to turn the lathe ***OFF***, disconnect it from power, and call Tech Support for help.

19. Push the STOP button in, move the spindle lever to the OFF position, then replace the end gear cover.

20. Lift the chuck guard up—this will activate the chuck guard safety switch. Reset the STOP button and attempt to start spindle rotation—the spindle should *not* start.

— If spindle rotation *does* start with the chuck guard in the up position, the safety switch is not operating correctly. This safety feature must operate properly before continuing operation. Press the STOP button to turn the lathe ***OFF***, disconnect it from power, and call Tech Support for help.

21. Re-start spindle rotation, use the cutting fluid pump switch on the control panel to start the pump, then open the valve. Verify that the cutting fluid flows from the nozzle, then turn the pump ***OFF***.

Congratulations! The test run is complete. Turn the lathe ***OFF*** and perform the following **Spindle Break-In** procedure.

Spindle Break-In

Before subjecting the lathe to full loads, it is essential to complete the spindle break-in process as described below. This will ensure the best results and maximum life of the precision components inside the lathe.

The break-in procedure must be performed in succession with the **Test Run** procedure described in this manual, because many of the test run steps prepare the lathe controls for the break-in process.

Important: Do not perform the break-in procedure independently from the **Test Run** section—serious damage could occur to the lathe if the controls are set differently than instructed in that section.

NOTICE

Do not leave the lathe unattended during the Spindle Break-In procedure. If your attention is needed elsewhere during this procedure, stop the lathe and restart the procedure later from the beginning.

To perform the spindle break-in:

1. Successfully complete the **Test Run** procedure beginning on **Page 25**.

2. Using the spindle speed range lever and the spindle speed dial to run the machine at the following speeds for 10 minutes each: 100, 250, 500, 1000, 1500, and 2000 RPM.

Note: If necessary, refer to **Spindle Speed** on **Page 48** for detailed instructions about selecting and changing spindle speeds.

3. Use the foot brake to stop spindle rotation, then run the spindle in reverse (spindle lever in the up position) at a speed of 2000 RPM for 10 minutes.

4. Use the foot brake to stop spindle rotation, then run the lathe at 250 RPM for 10 minutes with the feed range lever on the headstock in the **L** (low) position, and then run the lathe another 10 minutes with the lever in the **H** (high) position.

5. While the oil is still warm, change the headstock and gearbox oil (refer to **Lubrication** beginning on **Page 64** for detailed instructions).

6. Check the V-belt tension, and re-tension if necessary (refer to **V-Belts** on **Page 77** for detailed instructions).

Congratulations! The spindle break-in is complete.

NOTICE

After the first 16 hours of use, the V-belts will stretch and seat into the pulley grooves. The V-belts must be properly re-tensioned after this period to ensure proper power transmission and avoid reducing the life of the belts. Refer to the V-Belts subsection on Page 77 for detailed instructions.

Recommended Adjustments

For your convenience, the adjustments listed below have been performed at the factory. However, because of the many variables involved with shipping, we recommend that you at least verify the following adjustments to ensure the best possible results from your new machine.

Step-by-step instructions for these adjustments can be found on the pages referenced below.

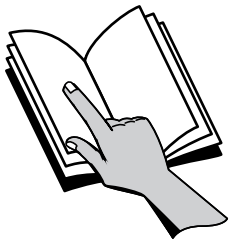
Factory adjustments that should be verified:

- Tailstock alignment with the spindle center (**Page 39**).
- Compound and cross slide backlash adjustment (**Page 74**).
- Gib adjustments (**Page 75**).

Operation Overview

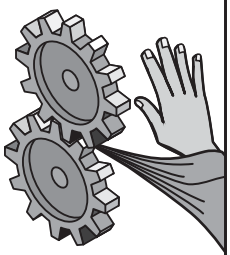
The purpose of this overview is to provide the novice machine operator with a basic understanding of how the machine is used during operation, so they can more easily understand the controls discussed later in this manual.

Note: Due to the generic nature of this overview, it is not intended to be an instructional guide for performing actual machine operations. To learn more about specific operations and machining techniques, seek training from people experienced with this type of machine, and do additional research outside of this manual by reading "how-to" books, trade magazines, or websites.



⚠WARNING

To reduce the risk of serious injury when using this machine, read and understand this entire manual before beginning any operations.



⚠WARNING

Loose hair, clothing, or jewelry could get caught in machinery and cause serious injury or death. Keep these items away from moving parts at all times to reduce this risk.

⚠WARNING

During operation, small metal chips may become airborne, leading to serious eye injury. Wear safety glasses to reduce this risk.

To complete a typical operation, the operator does the following:

1. Puts on safety glasses, rolls up sleeves, removes jewelry, and secures any clothing, jewelry, or hair that could get entangled in moving parts.
2. Examines the workpiece to make sure it is suitable for turning, then securely mounts the workpiece in one of the chucks or on the faceplate, and removes the chuck key from the chuck.
3. Mounts the tooling, aligns it with the workpiece, then backs it away to establish a safe startup clearance.
4. Clears all setup tools from the lathe.
5. Checks for safe clearances by rotating the workpiece by hand at least one full revolution.
6. Moves slides to where they will be used during operation.
7. Sets the correct spindle speed for the operation.
8. If using power feed, selects the proper feed rate for the operation.
9. Turns the master power switch ***ON***, resets the STOP button, then presses the spindle motor ON button.
10. Uses the spindle lever to start spindle rotation.
11. Uses the carriage handwheels or power feed options to move the tooling into the workpiece for operations.
12. When finished cutting, moves the spindle lever to the OFF position, presses the foot brake to completely stop the spindle, then removes the workpiece.

Chuck & Faceplate Mounting

This lathe is equipped with a D1-type spindle nose. This type of spindle uses camlocks that are adjusted with a chuck key to securely mount a chuck or faceplate with repeatable precision and ease.

⚠WARNING

Never use spindle speeds faster than the chuck RPM rating or the safe limits of your workpiece. Excessive spindle speeds greatly increase the risk of the workpiece or chuck being thrown from the machine with deadly force!

This lathe ships with the 3-jaw chuck installed. This is a scroll-type chuck where all three jaws move in unison when the chuck key is used.

The included 4-jaw chuck features independent jaws, which are used for square or unevenly-shaped stock, and to mount work that needs to be adjusted to near zero total indicated runout.

If neither chuck can hold your workpiece, the cast iron faceplate has slots for T-bolts that hold standard or custom clamping hardware. With the correct clamping hardware, a faceplate offers a wide range of uses, including machining non-concentric workpieces, straight turning between centers, off-center turning, and boring.

Installation & Removal Devices

Because chucks are heavy and often awkward to hold, some kind of lifting, support, or protective device should be used during installation or removal. The weight and size of the chuck will determine the appropriate device to use (refer to the following figure for examples).

⚠WARNING

A dropped chuck can cause amputation, serious crushing injuries, or property damage. Always use a lifting, support, or protective device to reduce this risk when installing or removing a chuck.

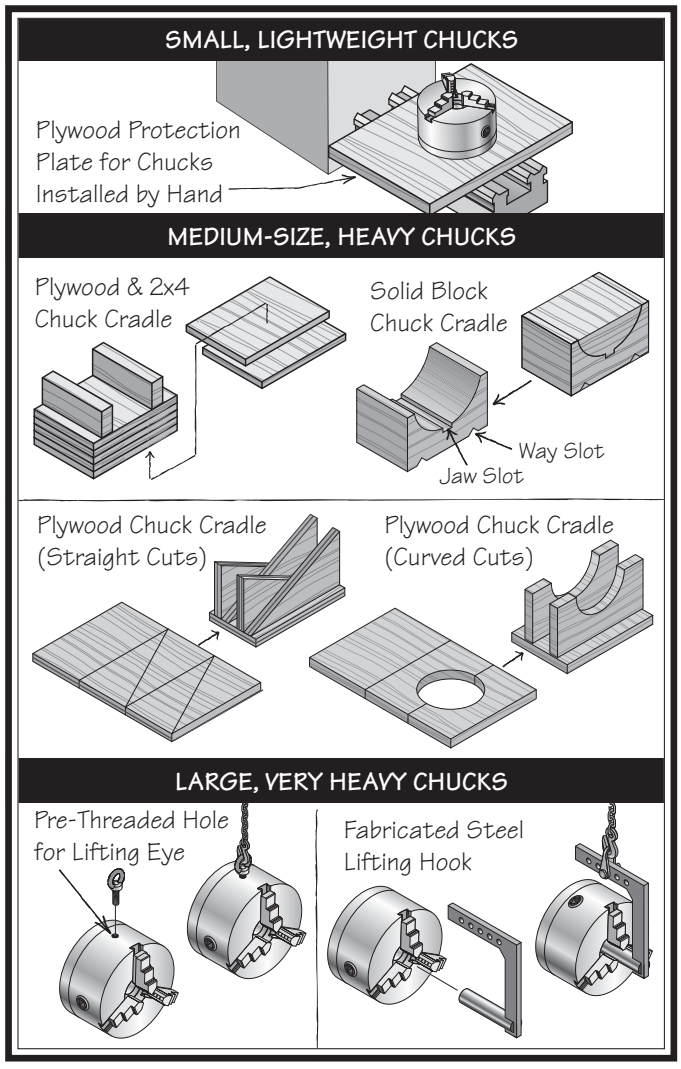

SMALL, LIGHTWEIGHT CHUCKS
Plywood Protection Plate for Chucks Installed by Hand
MEDIUM-SIZE, HEAVY CHUCKS
Plywood & 2x4 Chuck Cradle
Solid Block Chuck Cradle
Way Slot
Jaw Slot
Plywood Chuck Cradle (Straight Cuts)
Plywood Chuck Cradle (Curved Cuts)
LARGE, VERY HEAVY CHUCKS
Pre-Threaded Hole for Lifting Eye
Fabricated Steel Lifting Hook

Figure 26. Examples of common devices used during chuck installation and removal.

Chuck Installation

To ensure accurate work, it is extremely important to make sure the spindle nose and chuck mating surfaces/tapers are clean. Even a small amount of lint or debris can affect accuracy.

The chuck is properly installed when all camlocks are tight, the spindle and chuck tapers firmly lock together, and the back of the chuck is firmly seated against the face of the spindle all the way around—without any gaps.

To install the chuck:

1. DISCONNECT LATHE FROM POWER!

2. Use an appropriate lifting, support, or protective device to protect the ways and support the chuck during the installation process.

3. Clean and lightly oil the camlock studs, then thoroughly clean the mating surfaces of the spindle and chuck.

4. Install the chuck by inserting the camlock studs straight into the spindle cam holes.

Important: Avoid inserting the studs by pivoting them in from an angle or rotating the spindle. This can damage studs or spindle cam holes.

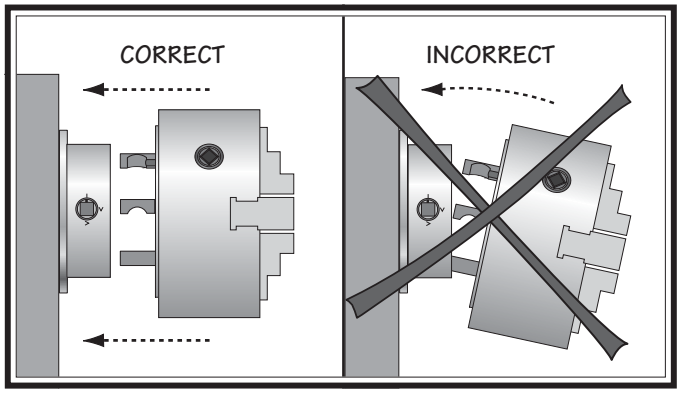


Figure 27. Inserting camlock studs into spindle cam holes.

5. Incrementally tighten the camlocks in a criss-cross or star pattern to ensure that the chuck seats evenly against the spindle.

6. When the chuck is fully seated and all the camlocks are tight, verify that the cam line is between the two "V" marks on the spindle nose, as shown in the following figure.

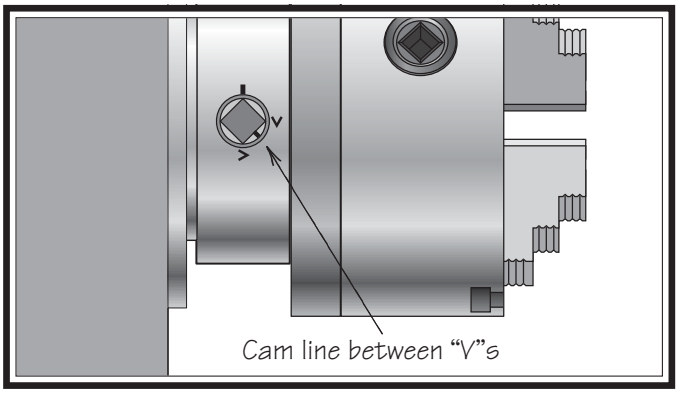


Figure 28. Cam line positioned between the "V" marks after the camlocks are fully tightened.

— If the cam line is NOT between the "V" marks when the camlock is tight, the stud may be installed at the incorrect height. To fix this, adjust the stud height as shown in the following figure. Make sure to re-install the stud cap screw afterward.

— If adjusting the stud height does not correct the problem, try swapping stud positions on the chuck.

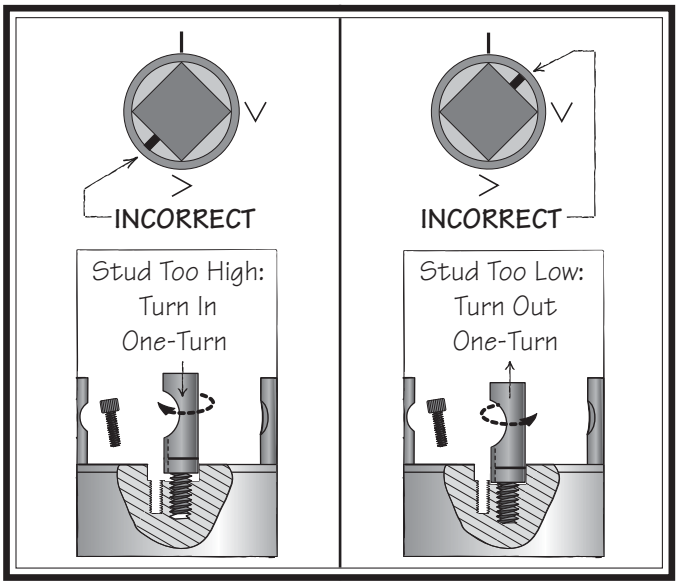


Figure 29. Correcting an improperly installed stud.

7. Verify that the chuck fits the spindle properly by checking for any gaps between the mating surfaces.

— If there are no gaps, proceed to **Step 8**.

— If there is a gap, remove the chuck, re-clean the mating surfaces carefully, and re-install. If the problem persists, contact our Tech Support.

8. Verify that the chuck/spindle tapers are seated firmly together by removing the chuck, per the **Chuck Removal** instructions, and pay close attention to how easily the tapers release.

— If it was necessary to bump the chuck or use a mallet to release the tapers, then they are seating together properly.

— If the tapers released easily with little intervention, they are not seated together firmly as required. Remove the chuck, re-clean the mating surfaces carefully, and re-install. If the problem persists, contact our Tech Support.

Registration Marks

Lightly stamp registration marks across the mating seams of chuck components. These marks will help you re-install the chuck in the same position after removal, which ensures consistent chuck balance and turning results, and allows the same camlocks and studs to operate together for consistent locking and unlocking.

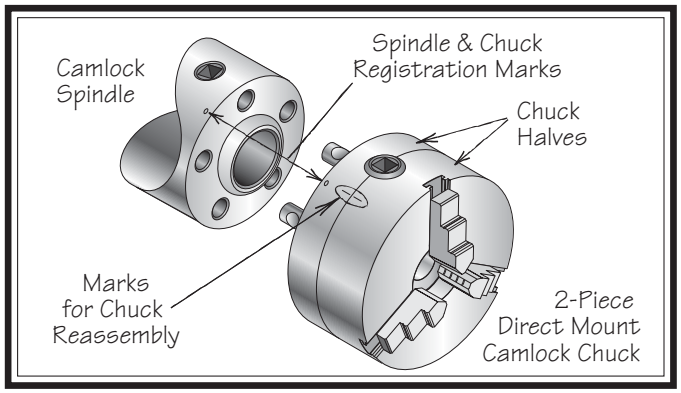


Figure 30. Registration mark locations.

Chuck Removal

To remove the chuck:

1. DISCONNECT LATHE FROM POWER!

2. Use an appropriate lifting, support, or protective device to protect the ways and support the chuck (refer to **Installation & Removal Devices** on **Page 31**).

3. Loosen the camlocks by turning the key counterclockwise until each of the cam lines are aligned with its corresponding spindle mark (see **Figure 31**).

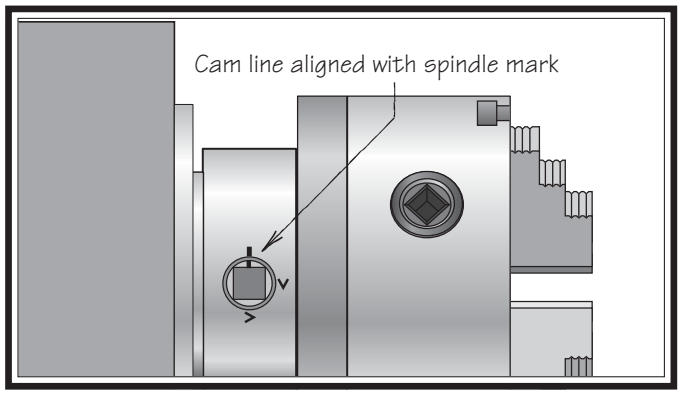


Figure 31. Camlock is fully loosened when the cam line is aligned with the spindle mark.

Tip: Camlocks can become very tight. A cheater pipe may be used as a last resort to add leverage when loosening. After loosening, you may need to wiggle the chuck key in the camlock to fully disengage the stud.

4. Using a dead blow hammer or other soft mallet, lightly tap around the outer circumference of the chuck body to loosen it from the spindle.

5. Remove the chuck from the spindle, using a light rocking motion to carefully slide the studs out of the cam holes.

— If the chuck does not immediately come off, rotate it approximately 60° and tap it again. Make sure all the marks on the cams and spindle are in proper alignment for removal.

Scroll Chuck Clamping

This scroll-type chuck has an internal scroll-gear that moves all jaws in unison when adjusted with the chuck key. This chuck will hold cylindrical parts on-center with the axis of spindle rotation and can be rotated at high speeds if the workpiece is properly clamped and balanced.

Never mix jaw types or positions to accommodate an odd-shaped workpiece. The chuck will spin out of balance and may throw the workpiece! Instead, use an independent jaw chuck or a faceplate.

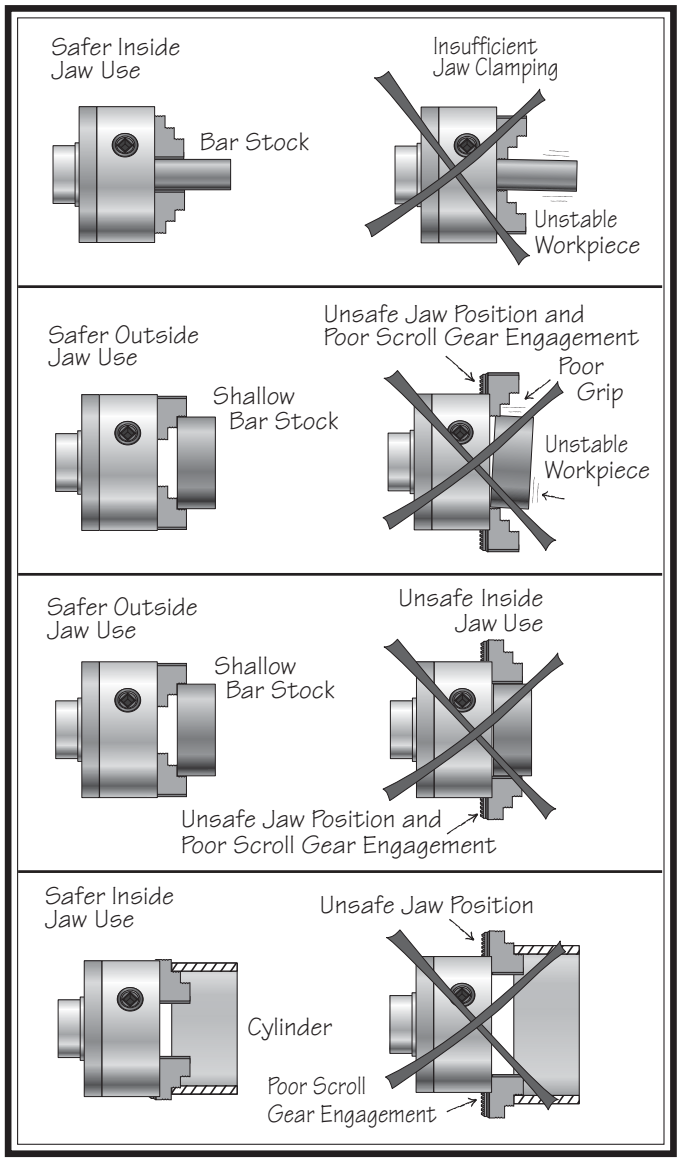


Figure 32. Jaw selection and workpiece holding.

4-Jaw Chuck

Refer to the **Chuck Installation** (see **Page 32**) and **Chuck Removal** (see **Page 33**) instructions to install or remove the 4-jaw chuck.

The 4-jaw chuck features independently adjustable hardened steel jaws for holding non-concentric or off-center workpieces. Each jaw can be independently removed from the chuck body and reversed for a wide range of work holding versatility.

⚠WARNING

Because of the dynamic forces involved in machining a non-concentric or off-center workpiece, always use a low spindle speed to reduce risk of the workpiece coming loose and being thrown from the lathe, which could cause death or serious personal injury.

Mounting Workpiece

1. DISCONNECT LATHE FROM POWER!
2. Place a chuck cradle or plywood on the bedway below the chuck to protect the bedway surfaces.
3. Use the chuck key to open each jaw so the workpiece will lay flat against the chuck face, jaw steps, or into the spindle opening.
4. With help from another person or a holding device, position the workpiece so it is centered in the chuck.

5. Tighten each jaw in small increments. After you have adjusted the first jaw, continue tightening the remaining jaws in an opposing sequence, as shown by the sequential order in **Figure 33**.

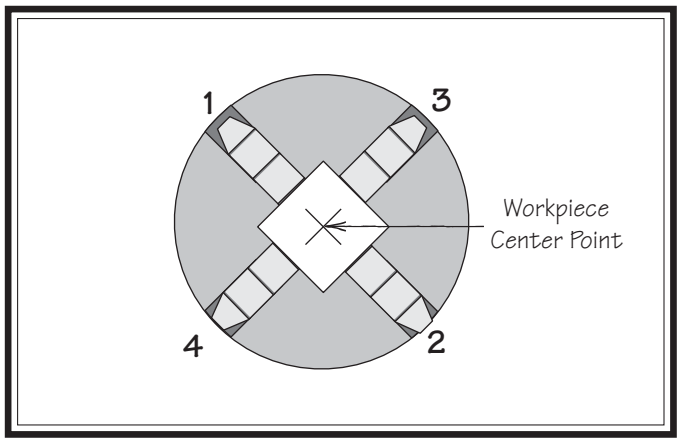


Figure 33. 4-jaw tightening sequence.

6. After the workpiece is held in place by the jaws, use a dial indicator to make sure the workpiece is centered in the chuck.

— If the workpiece is not correctly centered, make fine adjustments by slightly loosening one jaw and tightening the opposing jaw until the workpiece is correctly positioned (see **Figure 34** for an example).

Figure 34. Example photo of non-cylindrical workpiece correctly mounted on the 4-jaw chuck.

Faceplate

Refer to the **Chuck Installation** (see **Page 32**) and **Chuck Removal (see Page 33**) instructions to install or remove the faceplate.

The faceplate included with your lathe can be used for a wide range of operations, including machining non-concentric workpieces, straight turning between centers, off-center turning, and boring.

The tools needed for mounting a workpiece will vary depending on the type of setup you have.

⚠WARNING

Machining non-concentric workpieces at a high speed could cause the workpiece to be thrown from the spindle with deadly force at the operator or bystanders. To reduce this risk, only machine non-concentric workpieces at low speeds and clamp counter-weights to the faceplate to balance it.

⚠WARNING

Failure to properly secure a workpiece to the faceplate could cause the workpiece to be thrown from the lathe with deadly force at the operator or bystanders. Use a minimum of THREE independent clamping devices to hold the workpiece onto the faceplate.

To mount a non-concentric workpiece to the faceplate:

1. DISCONNECT LATHE FROM POWER!

2. Protect the bedway with a piece of plywood.

3. With help from another person or a holding device to support the workpiece, position it onto the faceplate and clamp it in place with a minimum of three independent clamping devices (see **Figure 35** for an example).

   Be sure to take into account the rotational and cutting forces that will be applied to the workpiece when clamping it to the faceplate. If necessary, use counter-weights to balance the assembly and use a dial indicator to make sure that the workpiece is properly positioned for your operation.

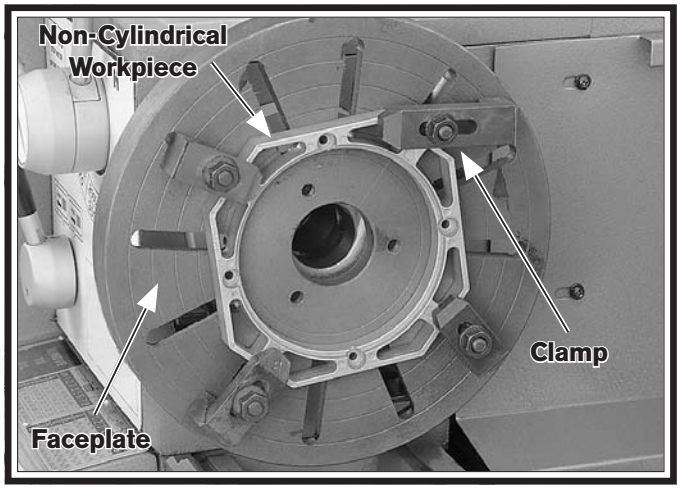


Figure 35. Example photo of workpiece clamped in a faceplate.

Tailstock

The tailstock (see **Figure 36**) is typically used to support long workpieces by means of a live or dead center (refer to **Centers** on **Page 40**). It can also be used to hold a drill or chuck to bore holes in the center of a part. Custom arbors and tapers can also be cut on your lathe by using the offset tailstock adjustment.

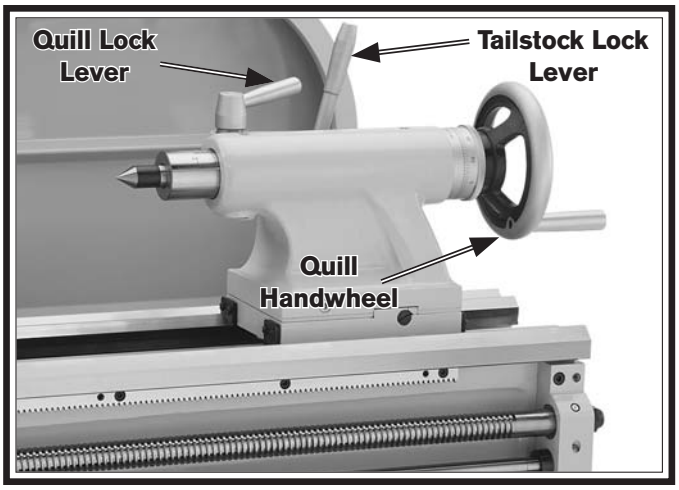


Figure 36. Tailstock and quill lock levers in locked position.

Graduated Dial

Increments.....0.001"
One Full Revolution.....0.100"

Increments on Quill

Inch.....0"-4⅜" in 1/16" Increments
Metric.....0–110mm in 1mm Increments

Positioning Tailstock

1. Pull the tailstock lock lever backward (away from the spindle) to unlock the tailstock from the bedway.

2. Slide the tailstock to the desired position.

3. Push the tailstock lock lever forward (toward the spindle) to lock the tailstock against the bedway.

Using Quill

1. Move the quill lock lever toward the spindle to unlock the quill.

2. Turn the quill handwheel clockwise to move the quill toward the spindle or counterclockwise to move it away from it.

3. Move the lock lever away from the spindle to secure the quill in place.

Installing Tooling

This tailstock uses a quill with an MT#5 taper that has a lock slot in the back of the bore that accepts tang arbors and drill bits (see **Figures 37–38** for examples).

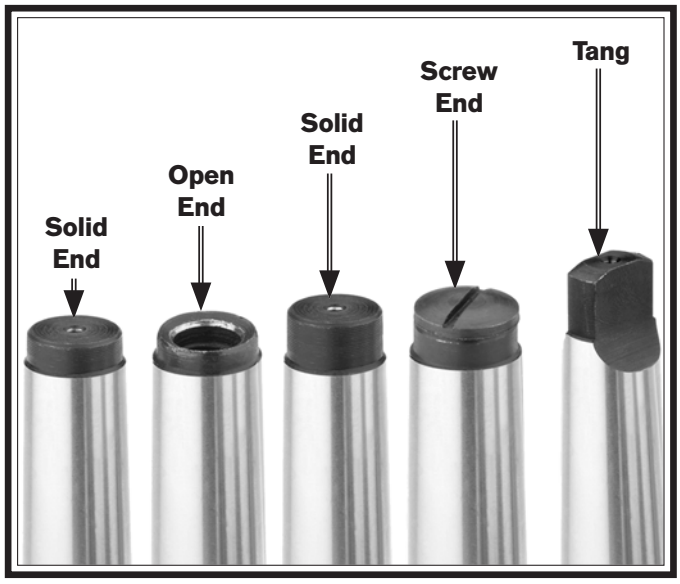


Figure 37. Types of tapered arbors and tooling.

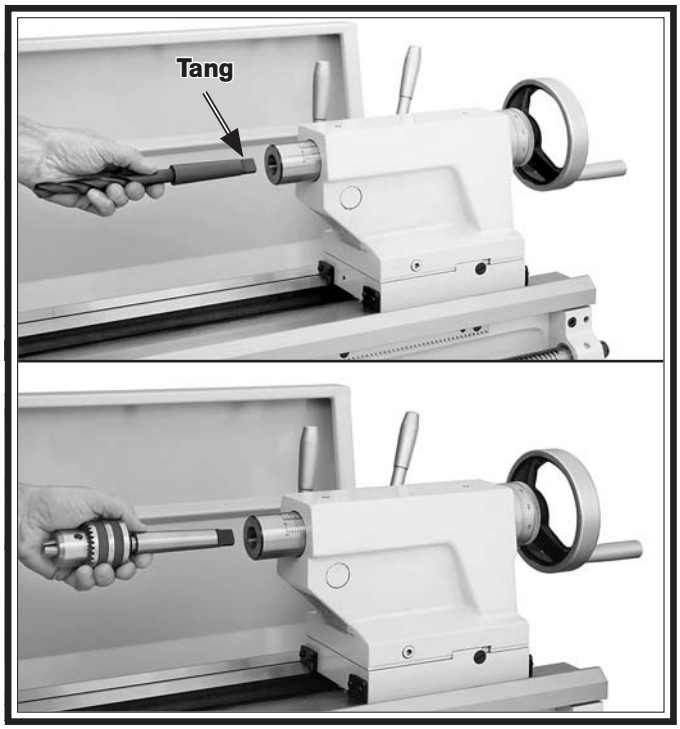


Figure 38. Example photos of inserting MT#5 tools with tangs into the tailstock.

However, other tooling without tangs, such as the four remaining tools shown in **Figure 37**, can still be used if the potential load will not exceed the strength of the tapered fit. For example, this includes smaller drill chucks, drill bits, and centers.

Note: If the tooling has an open hole in the end but is too short to be exposed in the drift slot for removal, then a screw can be threaded into the end of the tool to provide a solid surface for the quill pin to push against when the quill is retracted for tool removal. Otherwise, removal of such tooling may be difficult.

To install tooling in the tailstock:

1. With the tailstock locked in place, unlock the quill, then use the handwheel to extend it approximately 1".

2. Thoroughly clean and dry the tapered mating surfaces of the quill and the center, making sure that no lint or oil remains on the tapers.

Note: If the tapered tool shaft has a tang, align it with the slot in the back of the quill before seating it.

3. With a firm and quick motion, insert the tool into the quill. Check to see if it is firmly seated by attempting to twist it—a firmly seated tool will not twist.

4. Unlock the tailstock and move it until the tip of the tool is close to, but not touching, the workpiece, then re-lock the tailstock.

5. Start spindle rotation, unlock the quill, then turn the quill handwheel clockwise to feed the tool into the workpiece.

Removing Tooling

1. Use a shop rag to hold the tool.

2. Rotate the quill handwheel counterclockwise until the tool is forced out of the quill.

   — If the tool does not come loose by retracting the quill, extend the quill and use a drift key in the slot (see **Figure 39**) to remove the tool.

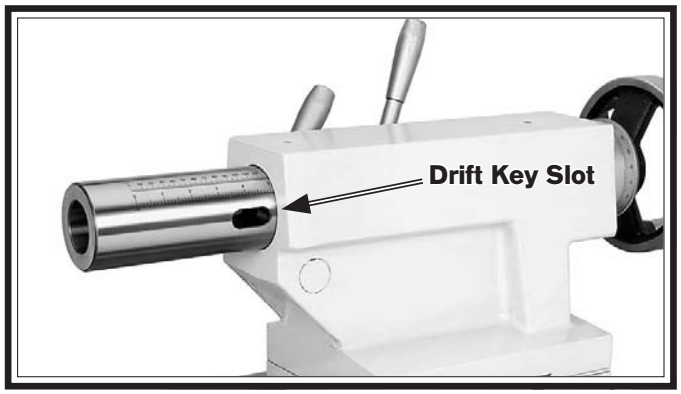


Figure 39. Example photo of the drift key slot in the side of the quill.

Offsetting Tailstock

The tailstock can be offset from the spindle centerline for turning tapers. Move the tailstock top casting toward the front of the lathe to machine a taper at the tailstock end. Conversely, position the tailstock top casting toward the back of the lathe to machine a taper at the spindle end.

Note: The marks on the offset indicator are arbitrary. For a precise offset, use a dial indicator to check quill movement while adjusting the screws.

Tools Needed	Qty
Hex Wrench 6mm	1
Wrench 17mm	1

To offset the tailstock:

1. Loosen the hex bolts underneath both ends of the tailstock to release the clamping pressure between the top and bottom castings (see **Figure 40**).

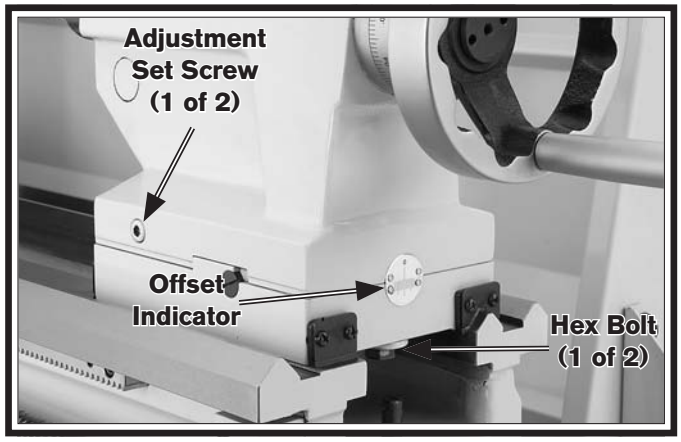


Figure 40. Tailstock offset controls.

2. Rotate the adjustment set screws in opposite directions for the desired offset (see the illustration in **Figure 41**).

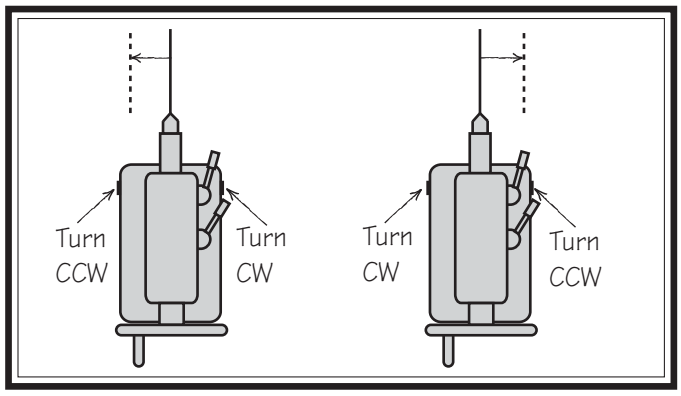


Figure 41. Set screw adjustment in relation to tailstock movement.

3. Retighten the clamping hex bolts underneath the tailstock to secure the offset.

Aligning Tailstock to Spindle Centerline

This is an essential adjustment that should be verified or performed each time the tailstock is used to turn concentric workpieces between centers or immediately after offsetting the tailstock when turning a taper. If the tailstock is not aligned with the spindle centerline when it is supposed to be, turning results will be inaccurate along the length of the workpiece.

Items Needed	Qty
Hex Wrench 6mm	1
Wrench 17mm	1
Round Stock 2" x 6"	2
Precision Level	1

To align the tailstock to the spindle centerline:

1. Use the precision level to make sure the bedway is level from side-to-side and from front-to-back.

   — If the bedway is not level, correct this condition before continuing with this procedure (refer to **Leveling & Mounting** on **Page 22**).

2. Center drill both ends of one piece of round stock, then set it aside for use in **Step 5**.

3. Use the other piece of round stock to make a dead center, and turn it to a 60° point, as illustrated in **Figure 42**.

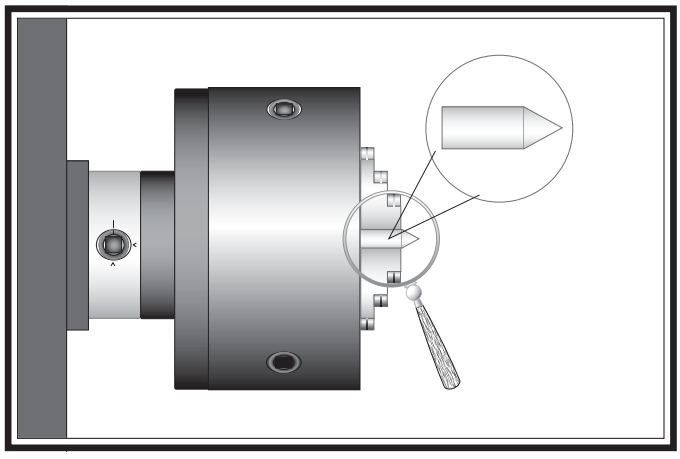


Figure 42. Turning a dead center.

Note: As long as this dead center remains in the chuck, the point of the center will remain true to the spindle centerline. The point will have to be refinished whenever the center is removed and then returned to the chuck.

4. Install a center in the tailstock.

5. Attach a lathe dog to the test stock from **Step 2**, then mount it between the centers (see **Figure 43** for an example).

Figure 43. Example photo of stock mounted between the centers.

6. Turn 0.010" off the stock diameter.

7. Mount a test or dial indicator so that the plunger is on the tailstock quill.

Note: If necessary in the following step, refer to **Offsetting Tailstock** on **Page 38** for detailed instructions.

8. Use calipers to measure both ends of the workpiece.

— If the test stock is *thicker* at the tailstock end, move the tailstock toward the *front* of the lathe ½ the distance of the amount of taper (see **Figure 44**).

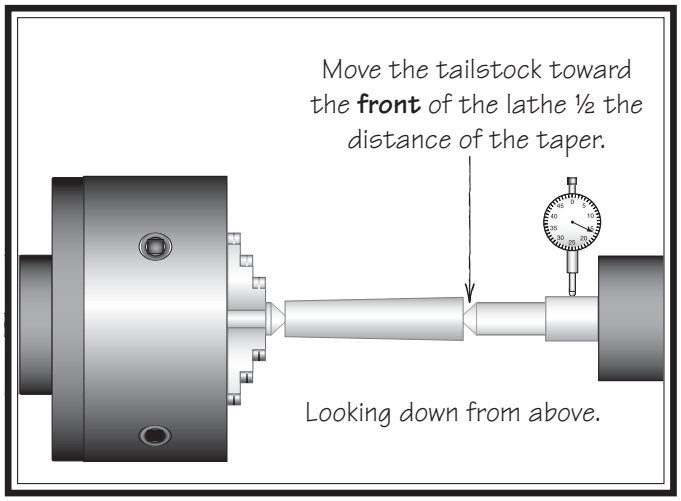


Figure 44. Adjust tailstock toward the operator.

— If the test stock is *thinner* at the tailstock end, move the tailstock toward the *back* of the lathe ½ the distance of the amount of taper (see **Figure 45**).

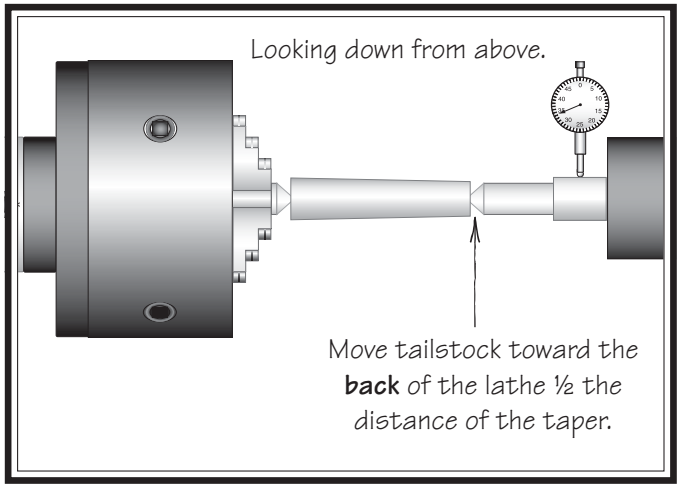


Figure 45. Adjust tailstock away from the operator.

9. Repeat **Steps 6–8** until the desired accuracy is achieved.

Centers

Figure 46 shows the MT#5 dead centers included with the lathe. In addition, an MT#7–MT#5 tapered spindle sleeve is included for mounting centers in the spindle.

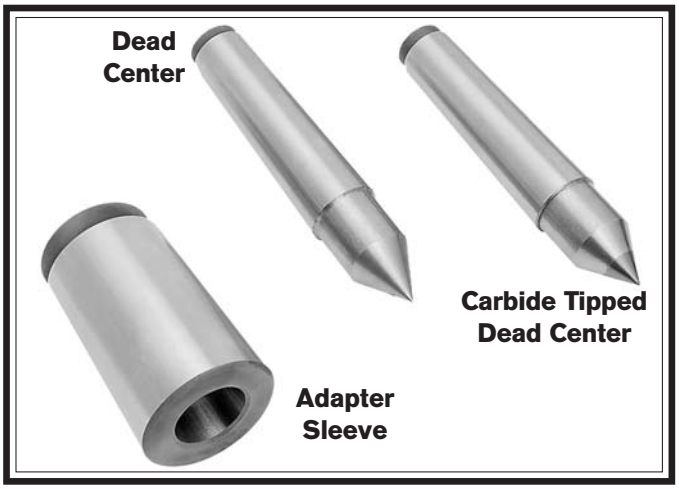


Figure 46. Adapter sleeve and dead centers.

Dead Centers

A dead center is a one-piece center that does not rotate with the workpiece and is used to support long, slender workpieces

Use the dead center in the spindle for operations where the workpiece rotates with the center and does not generate friction.

The carbide-tipped dead center can better withstand the effects of friction and is best used in the tailstock where the workpiece will rotate against it. The tip of the center must be generously lubricated during the operation to avoid premature wear and maximize smooth operation. Using low spindle speeds will also reduce the heat and wear from friction.

Live Centers

A live center has bearings that allow the center tip and the workpiece to rotate together; it can be installed in the spindle and the tailstock quill for higher speeds. However, a live center typically does not provide the same level of rigidity as a dead center, and final workpiece accuracy can suffer as a result.

Mounting Dead Center in Spindle

1. DISCONNECT LATHE FROM POWER!

2. Thoroughly clean and dry the tapered mating surfaces of the spindle bore, adapter sleeve, and the center, making sure that no lint or oil remains on the tapers.

Note: This will prevent the tapered surfaces from seizing due to operational pressures, which could make it very difficult to remove the center.

3. Mount a chuck or faceplate onto the spindle, whichever is correct for your operation.

4. Insert the center into the sleeve, then insert the sleeve into the spindle bore through the chuck or faceplate.

   Figure 47 shows an example photo of a dead center installed in the spindle, using a lathe dog and faceplate for turning between centers.

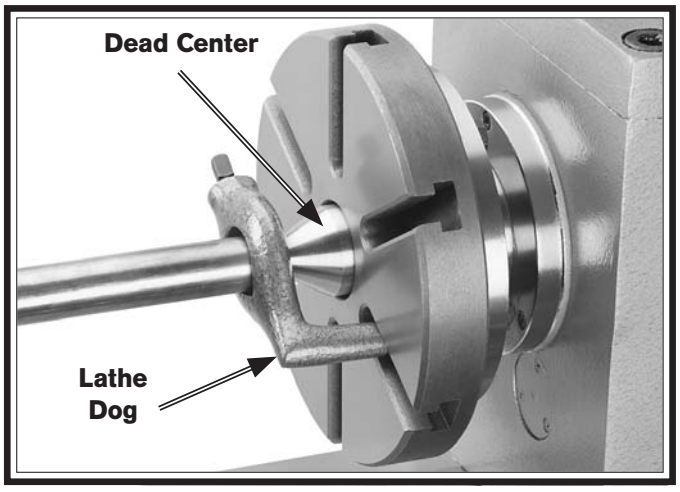


Figure 47. Example photo of using a dead center with a faceplate and lathe dog.

Removing Center from Spindle

To remove the sleeve and center from the spindle, insert a piece of round bar stock or similar tool through the outboard end (on the left side of the headstock). Have another person hold onto the sleeve and center with a gloved hand or shop rag, then tap the sleeve loose.

NOTICE

To avoid premature wear of the dead center or damage to the workpiece, use low spindle speeds and keep the tip of the dead center mounted in the tailstock well lubricated.

Mounting Center in Tailstock

Either a carbide-tipped dead center or live center can be used in the tailstock. Mounting instructions are the same for both. **Figure 48** shows an example photo of a dead center mounted in a tailstock.

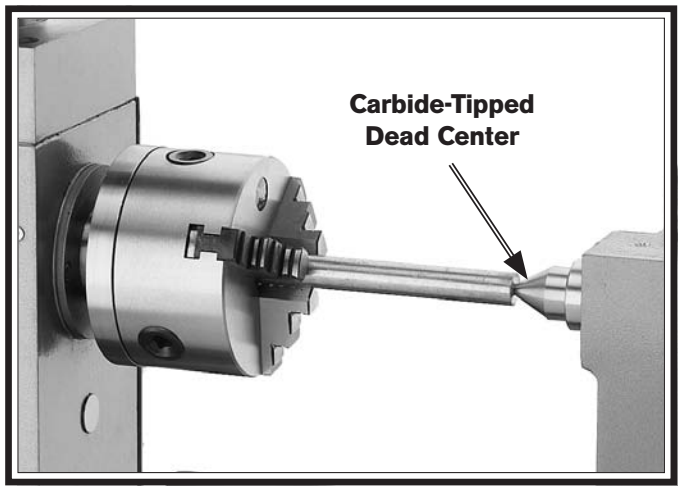


Figure 48. Example photo of using a carbide-tipped dead center installed in the tailstock.

To mount a center in the tailstock:

1. DISCONNECT LATHE FROM POWER!

2. Thoroughly clean and dry the tapered mating surfaces of the tailstock quill bore and the center, making sure that no lint or oil remains on the tapers.

3. Use the quill handwheel to feed the quill out from the casting approximately 1".

Note: Do not extend the quill more than 2" or stability and accuracy will be reduced.

4. Insert the center into the tailstock quill.

5. Seat the center firmly into the quill during workpiece installation by rotating the quill handwheel clockwise to apply pressure, with the center engaged in the center hole in the workpiece.

Note: Only apply enough pressure with the tailstock quill to securely mount the workpiece between centers. Avoid overtightening the center against the workpiece, or it may become difficult to remove later, and it will result in excessive friction and heat, which may damage the workpiece and center.

Removing Center from Tailstock

To remove the center from the quill, hold onto it with a gloved hand or shop rag, then rotate the quill handwheel counterclockwise to draw the quill back into the casting until the center releases.

If the center does not come loose by retracting the quill, extend the quill to expose the slot (see **Figure 49**), then use a drift key to remove the center.

Figure 49. Example photo of the drift key slot in the side of the quill.

Mounting Workpiece Between Centers

1. DISCONNECT LATHE FROM POWER!

2. Drill center holes in both ends of the workpiece.

3. Install a dead center in the spindle with a lathe dog and a chuck or faceplate, then install a live center or carbide-tipped dead center in the tailstock.

4. Lubricate the workpiece center holes, then mount the workpiece between the centers and hold it in place with light pressure from the tailstock center.

5. Seat the center firmly into the quill by rotating the quill handwheel clockwise to apply pressure against the workpiece (see the example in **Figure 50**).

   Only apply enough pressure to securely mount the workpiece between centers. Avoid over-tightening the center against the workpiece, or it may become difficult to remove later. Also, over-tightening will result in excessive friction and heat, which may damage the workpiece or center.

Figure 50. Example photo of a workpiece mounted between the centers.

Steady Rest

The steady rest supports long shafts and can be mounted anywhere along the length of the bedway.

Familiarize yourself with the steady rest components shown in **Figure 51** to better understand its operation.

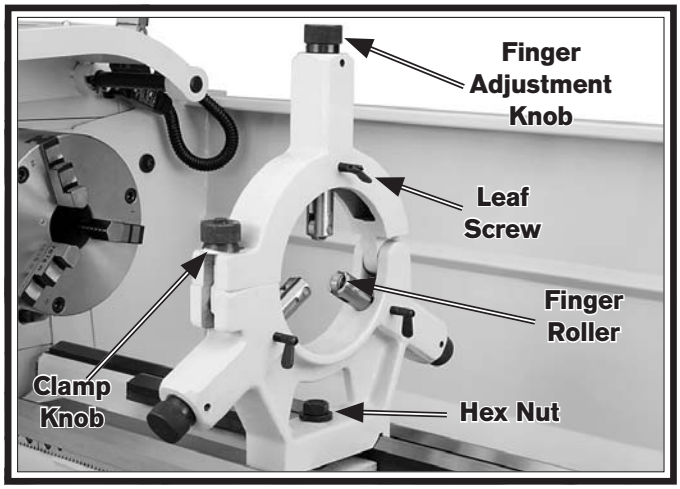


Figure 51. Steady rest components.

To install and use the steady rest:

1. DISCONNECT LATHE FROM POWER!

2. Thoroughly clean all mating surfaces, then place the steady rest base on the bedways so the triangular notch fits over the bedway prism.

3. Position the steady rest where required to properly support the workpiece, then tighten the hex nut shown in **Figure 51** to secure it in place.

4. Loosen the clamp knob that secures the two halves of the steady rest and open the top portion, as shown in **Figure 52**.

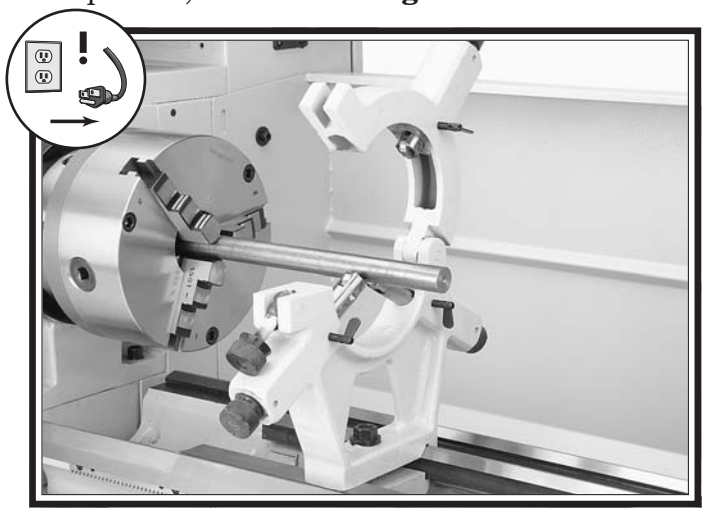


Figure 52. Workpiece mounted in the steady rest.

5. Loosen the three leaf screws so the finger roller positions can be adjusted.

6. Use the finger adjustment knobs to position the bottom two finger rollers against the workpiece, as shown in the example of **Figure 52**.

7. Close the steady rest, then use the finger adjustment knobs to adjust all three finger rollers so that they just touch the workpiece without causing deflection.

Note: The finger rollers should properly support the workpiece along the spindle centerline while still allowing it to freely rotate.

8. Tighten the three leaf screws to secure the settings.

Follow Rest

The follow rest mounts to the saddle with two cap screws (see **Figure 53**). It is used on long, slender parts to prevent workpiece deflection from the pressure of the cutting tool during operation. Adjust the follow rest fingers in the same manner as the those on the steady rest.

Note: To reduce the effects of friction, lubricate the brass finger tips with generous lubricant during operation.

Figure 53. Follow rest attachment.

Carriage & Slide Locks

The carriage, cross slide, and compound rest have locks that can be tightened to provide additional rigidity during operation, especially during heavy cuts or close tolerance work.

See **Figures 54–55** to identify the locations of the locks for each device.

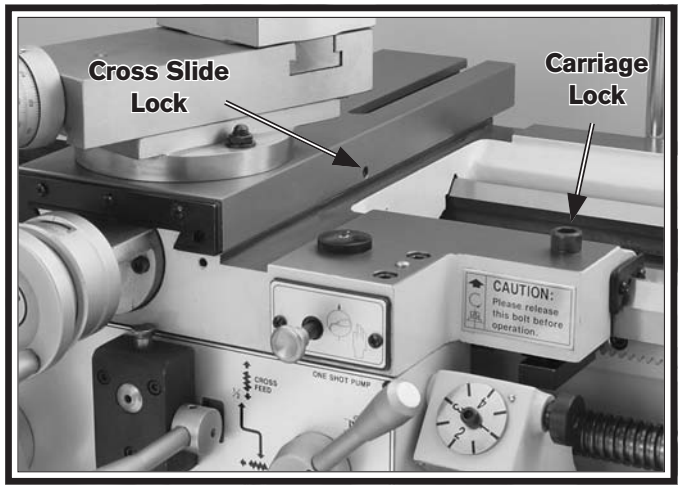


Figure 54. Location of carriage and cross slide locks.

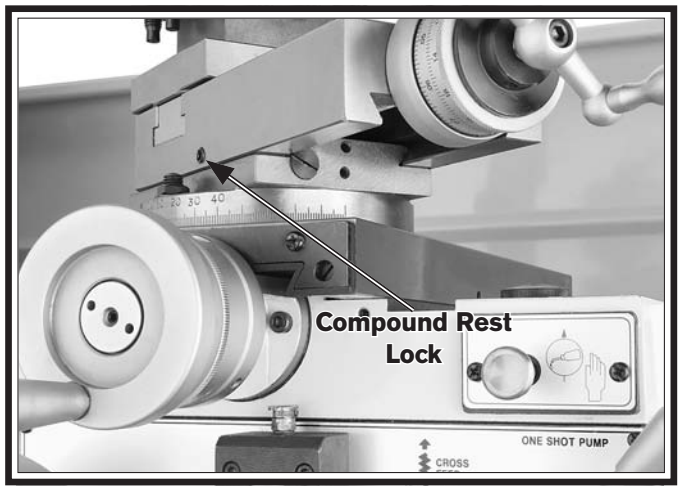


Figure 55. Location of compound rest lock.

Compound Rest

The compound rest handwheel has an indirect-read graduated scale. This means that the distance shown on the scale represents the actual distance the cutting tool moves. The base of the compound rest has another graduated scale used for setting the cutting tool to a specific angle.

Graduated Dial

Increments.....0.001" (0.02mm)
One Full Revolution.....0.100" (2.54mm)

Tool Needed	Qty
Wrench 14mm	1

To set the compound rest at a certain angle:

1. Loosen the two hex nuts at the base of the compound rest (1 of 2 shown in **Figure 56**).

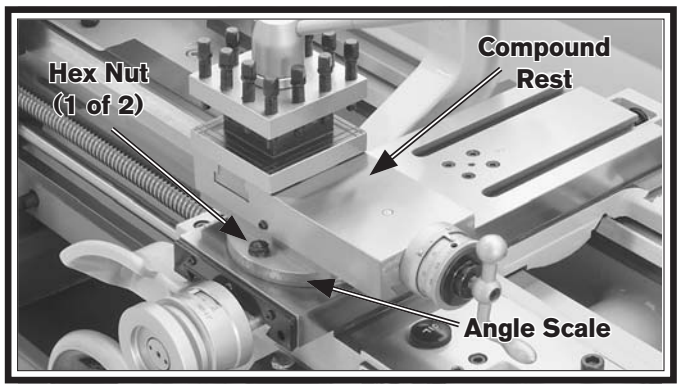


Figure 56. Compound rest.

2. Rotate the rest to the desired angle, as indicated by the scale at the base, then retighten the two hex nuts.

Tip: The first time you set the angle of the compound rest for cutting threads, mark the location on the cross slide as a quick reference point. This will allow you to quickly return the compound rest to that exact angle the next time you need to cut threads.

Four-Way Tool Post

The four-way tool post is mounted on top of the compound rest and allows a maximum of four tools to be loaded simultaneously.

Each tool can be quickly indexed to the workpiece by loosening the top handle, rotating the tool post to the desired position, then re-tightening the handle to lock the tool into position.

Installing Tool

Tool Needed	Qty
Tool Post T-Wrench	1

To install a tool in the tool post:

1. Adjust the tool post bolts so that the cutting tool can fit underneath them (see **Figure 57**).

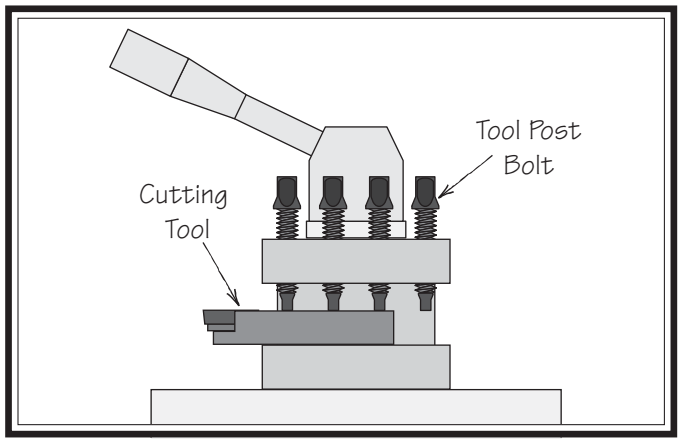


Figure 57. Example of tool mounted in tool post.

⚠WARNING

Over-extending a cutting tool from the post will increase the risk of tool chatter, breakage, or tool loosening during operation, which could cause metal pieces to be thrown at the operator or bystanders with great force. DO NOT extend a cutting tool more than 2.5 times the width of its cross-section (e.g, 2.5 x 0.5" = 1.25").

2. Firmly secure the cutting tool with at least two tool post bolts.

3. Check and adjust the cutting tool to the spindle centerline, as instructed in the next subsection.

Aligning Cutting Tool with Spindle Centerline

For most operations, the cutting tool tip should be aligned with the spindle centerline, as illustrated in **Figure 58**.

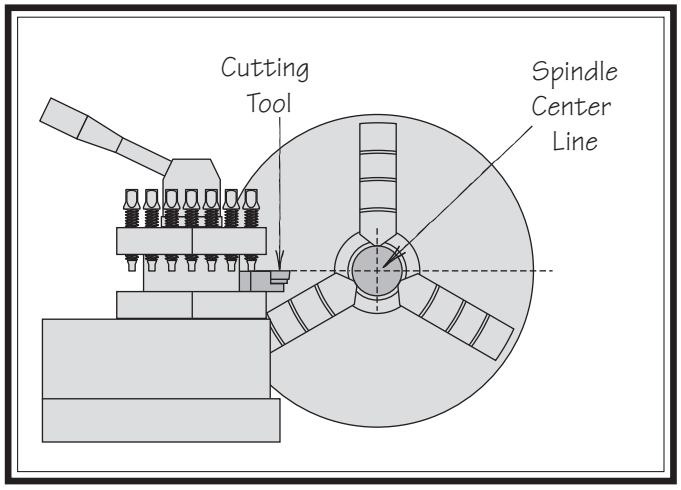


Figure 58. Cutting tool aligned with spindle centerline (viewed from tailstock).

There are a number of ways to check and align the cutting tool to the spindle centerline. If necessary, you can raise the cutting tool by placing steel shims underneath it. The shims should be as long and as wide as the cutting tool to properly support it.

Below are two common methods:

- Align the tip of the cutting tool with a center installed in the tailstock, as instructed on the next page. For this to work, the tailstock must be aligned to the spindle centerline (refer to **Aligning Tailstock To Spindle Centerline** on **Page 39** for detailed instructions).

- Make a facing cut on a piece of round bar stock. If the tool is above or below the spindle centerline, a nub will be left in the center of the workpiece. Adjust the height of the tool, then repeat the facing cut to check the adjustment. Repeat as necessary until the center of the workpiece face is smooth.

Tools Needed	Qty
Tool Post T-Wrench	1
Steel Shims	As Needed
Cutting Tool	1
Fine Ruler	1
Tailstock Center	1

To align the cutting tool with the tailstock center:

1. Mount the cutting tool in the tool post, then secure the post so the tool faces the tailstock.

2. Install a center in the tailstock, and position the center tip near the cutting tool tip.

3. Lock the tailstock and quill in place.

4. Adjust the height of the cutting tool so that the tool tip is aligned vertically and horizontally with the center tip, as shown in **Figure 59**.

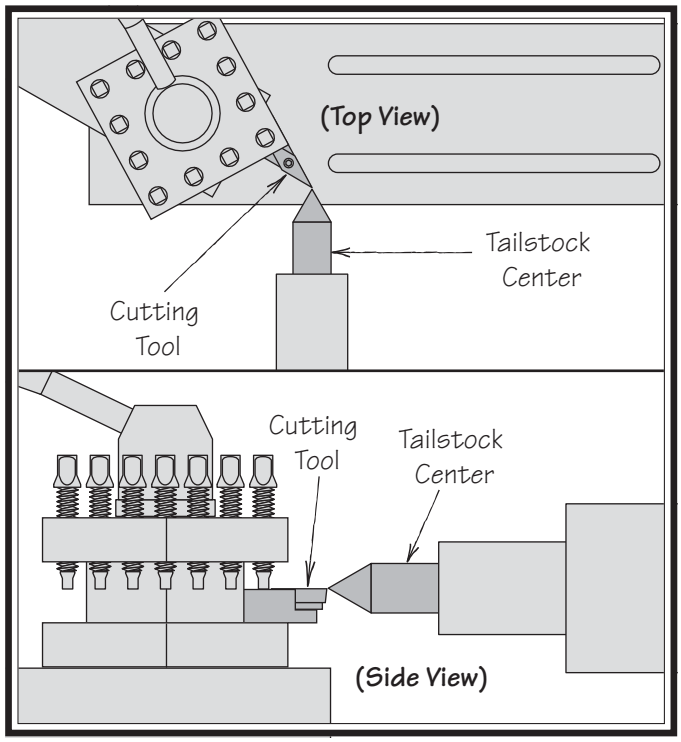


Figure 59. Cutting tool tip aligned with tailstock center.

Adjustable Feed Stop

The adjustable feed stop collar shown in **Figure 60**, is designed to stop carriage movement when using the feed rod. When the apron stop plate contacts the stop collar, the feed rod clutch disengages and carriage movement stops.

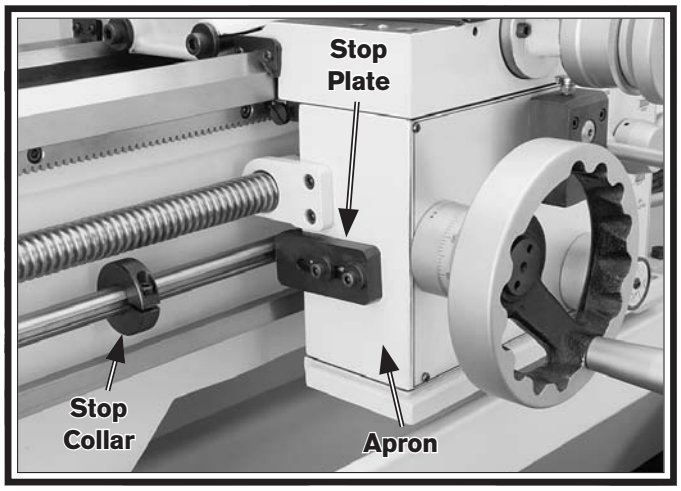


Figure 60. Adjustable feed rod stop collar.

To use the adjustable feed stop, secure the feed stop collar at the location where the carriage should disengage from power feed and stop movement.

NOTICE

The adjustable feed stop will NOT stop carriage movement when it is engaged with the leadscrew. Do NOT attempt to use this stop when threading!

Micrometer Stop

The micrometer stop allows you to manually stop the carriage at the same position for repeat cuts, such as when turning up to a shoulder. The micrometer stop includes a graduated dial that allows you to precisely position the stop.

NOTICE

The micrometer stop on this lathe is designed for manually stopping the carriage at the same position for repeat cuts. The carriage will NOT automatically stop by itself when it contacts the micrometer stop.

Tools Needed	Qty
Hex Wrench 8mm	1

To set the micrometer stop:

1. DISCONNECT LATHE FROM POWER!

2. Loosen the cap screws shown in **Figure 61**, then use the carriage handwheel to position the carriage at the desired stopping point.

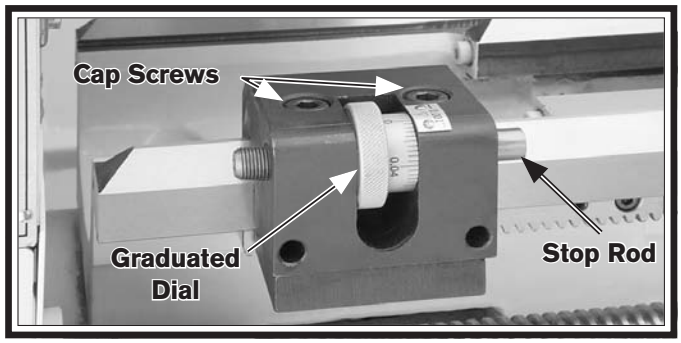


Figure 61. Micrometer stop.

3. Move the micrometer stop up to the carriage, use the graduated dial to fine tune the position, then retighten the cap screws loosened in **Step 2**.

4. Verify that tooling will not make contact with the chuck, jaws, or other components.

Manual Feed

The handwheels shown in **Figure 62** allow the operator to manually move the cutting tool.

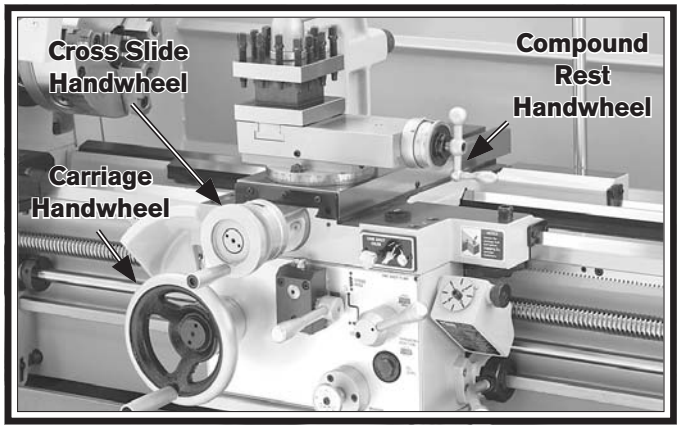


Figure 62. Carriage Controls.

Carriage Handwheel

The carriage handwheel moves the carriage left or right along the bed. It has a graduated dial with 0.01" increments, and one full revolution moves the carriage 0.80". Pull the handwheel out to disengage it during power feed operations—this will prevent entanglement hazards.

Cross Slide Handwheel

The cross slide handwheel moves the tool toward and away from the work. Adjust the position of the graduated scale by holding the handwheel with one hand and turning the dial with the other. The cross slide handwheel has a direct-read graduated dial, which means that the dial displays the amount removed from the workpiece diameter (the slide only moves half the distance shown on the dial). The dial has 0.001" (0.02mm) increments, and one full revolution equals 0.200" (2.54mm). Rotate the dial collar 180° to read in metric units.

Compound Rest Handwheel

The compound rest handwheel moves the cutting tool linearly along the set angle of the compound rest. The compound rest angle is set by hand-rotating it and securing in place with two hex nuts. The compound rest has an indirect-read graduated dial with 0.001" (0.02mm) increments. One full revolution of the handwheel moves the slide 0.100" (2.54mm). Rotate the dial collar 180° to read in metric units.

Spindle Speed

Using the correct spindle speed is important for safe and satisfactory results, as well as maximizing tool life.

To set the spindle speed for your operation, you will need to: 1) Determine the best spindle speed for the cutting task, and 2) configure the lathe controls to produce the required spindle speed.

Determining Spindle Speed

Many variables affect the optimum spindle speed to use for any given operation, but the two most important are the recommended cutting speed for the workpiece material and the diameter of the workpiece, as noted in the formula shown in **Figure 63**.

$$\frac{*\text{Recommended Cutting Speed (FPM)} \times 12}{\text{Dia. of Cut (in inches)} \times 3.14} = \text{SpindleSpeed (RPM)}$$

*Double if using carbide cutting tool

Figure 63. Spindle speed formula for lathes.

Cutting speed, typically defined in feet per minute (FPM), is the speed at which the edge of a tool moves across the material surface.

A recommended cutting speed is an ideal speed for cutting a type of material in order to produce the desired finish and optimize tool life.

The books **Machinery's Handbook** or **Machine Shop Practice**, and some internet sites, provide excellent recommendations for which cutting speeds to use when calculating the spindle speed. These sources also provide a wealth of additional information about the variables that affect cutting speed and they are a good educational resource.

Also, there are a large number of easy-to-use spindle speed calculators that can be found on the internet. These sources will help you take into account the applicable variables in order to determine the best spindle speed for the operation.

Setting Spindle Speed

Setting the spindle speed requires positioning the spindle speed range lever to either the high or low range, then using the spindle speed dial to set the speed, using the digital readout as a guide.

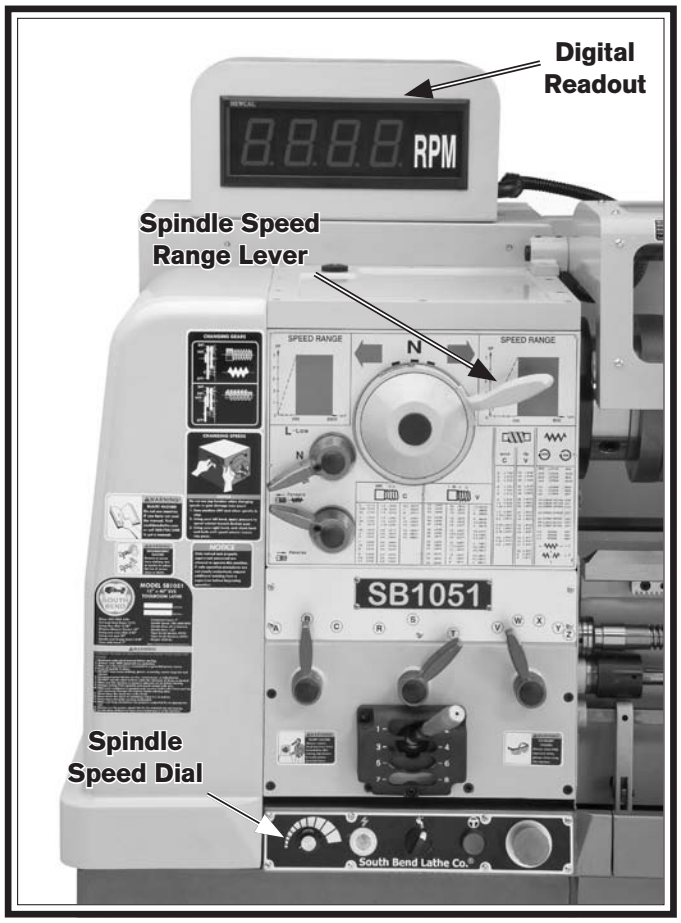


Figure 64. Spindle speed controls.

To set the spindle speed:

1. Press the STOP button and make sure the spindle is at a complete stop.

2. Rotate the spindle speed range lever (see **Figure 64**) to select the spindle speed range.

   — **High Range (500–3000 RPM):** Rotate the lever to the left.

   — **Low Range (100–500 RPM):** Rotate the lever to the right.

Note: If necessary, rock the spindle back and forth by hand to aid in meshing the headstock gears as you rotate the lever.

3. Rotate the spindle speed dial on the control panel all the way counterclockwise to set it at the minimum speed for startup.

4. Reset the STOP button and start spindle rotation.

5. Rotate the spindle speed dial slowly clockwise until the spindle has reached the desired speed, as displayed in the digital readout on top of the headstock.

Power Feed

Both the carriage and cross slide have power feed capability when the carriage is engaged with the feed rod. The rate that these components move (feed rate) is controlled by the headstock and quick-change gearbox lever positions, and the end gear configuration.

Feed rate and spindle speed must be considered together. Keep in mind that the feed rate is expressed in the amount of travel per revolution of the spindle. The sources you use to determine the optimum spindle speed for an operation will also provide the optimal feed rate to use with that spindle speed.

Often, the experienced machinist will use the feeds and speeds given in their reference charts or web calculators as a starting point, then make minor adjustments to the feed rate (and sometimes spindle speed) to achieve the best results.

The carriage can alternately be driven by the leadscrew for threading operations. However, this section only covers the use of the power feed option for the carriage and cross slide components for non-threading operations. To learn how to power the carriage for threading operations, refer to **Threading** on **Page 54**.

NOTICE

Operating the lathe at spindle speeds higher than 350 RPM when the high (H) gearbox range is selected could result in gearbox damage. Always use spindle speeds of 350 RPM or lower when using the high (H) gearbox range.

NOTICE

ALWAYS make sure the spindle is completely stopped BEFORE using the headstock control levers to make changes. If the spindle is rotating when attempting to change the configuration of the headstock feed controls, the gears in the headstock and quick-change gearbox will become damaged!

Power Feed Controls

Use **Figures 65–66** and the following descriptions to become familiar with the locations and functions of the power feed controls.

Note: Before using power feed, you may have to re-configure the end gears, depending on how they are set up. Refer to **End Gears** on **Page 52** for detailed instructions.

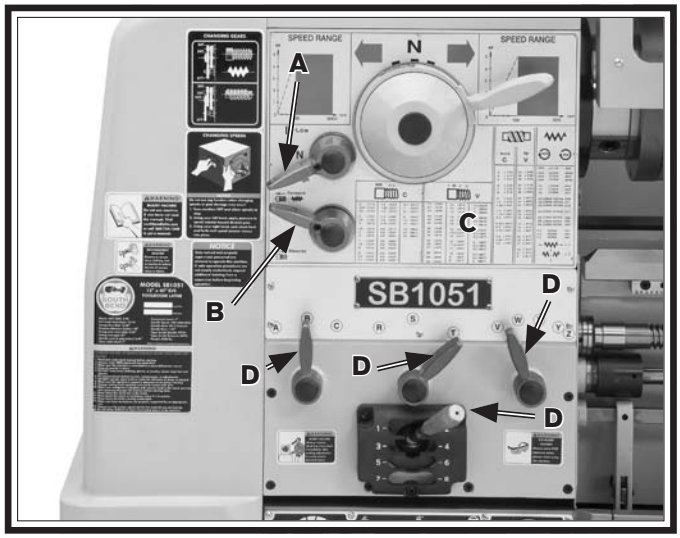


Figure 65. Power feed controls on the headstock.

A. Feed Range Lever: Selects the low or high feed rate range by re-aligning the headstock transfer gear. In the middle position, disables power feed.

B. Feed Direction Lever: When the lathe is stopped, selects the direction for power feed.

Note: When the lathe is running, use the quick-change feed direction knob on the apron.

NOTICE

Depending on the combined configuration of the headstock feed direction lever and the apron feed direction knob, the actual direction of power feed may be different from the printed indicators on the machine!

C. Feed Rate Chart: Displays the settings for the headstock and quick-change gearbox controls for the selected feed rate. Refer to **Setting Power Feed Rate** subsection on the next page for detailed instructions.

D. Quick-change Gearbox Feed Levers: Configure the quick-change gearbox gears for the feed rate selected.

— Left Lever Positions: A–C

— Middle Lever Positions: R–T

— Right Lever Positions: V–Z

— Bottom Lever Positions: 1–8

NOTICE

Do not attempt to engage the feed selection lever and the half nut lever at the same time. The lathe is equipped with a protective mechanism to prevent this, but the mechanism can break if the levers are forced.

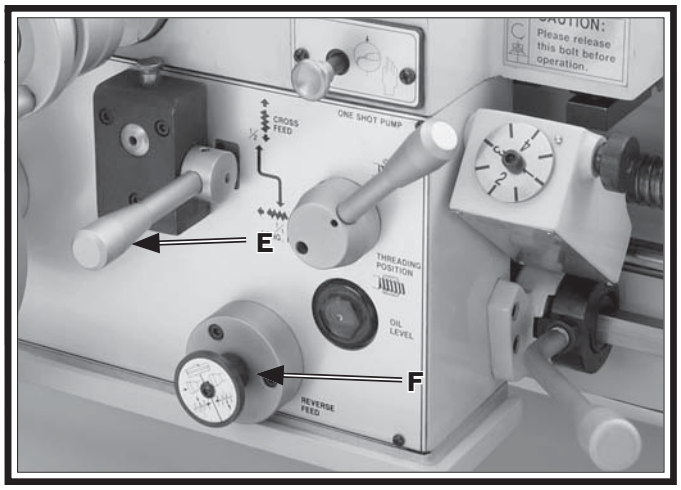


Figure 66. Apron power feed controls.

E. Feed Selection Lever: Engages the power feed for either the cross slide or the carriage (see **Figure 67**).

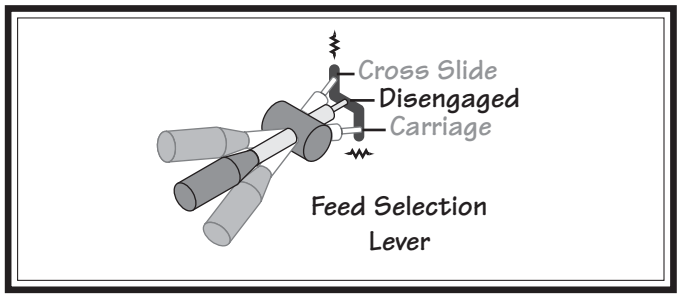


Figure 67. Feed selection lever positions.

When the lever is *down* and the indent pin is pointing up, the cross slide is selected. Conversely, when the lever is *up* and the pin is pointing down, the carriage is selected. In the *middle* position, the apron gears are disengaged from the feed rod and neither component will move.

Note: When using this lever, you may need to slightly rotate the handwheel of the component you are trying to engage, so that the apron gears can mesh.

F. Apron Feed Direction Knob: Reverses the feed direction from what is shown on the headstock.

Note: The advantage of using this knob is that you can quickly reverse power feed direction while the spindle is rotating—without having to turn the lathe off, waiting until the spindle is stopped, then using the feed direction lever on the headstock.

Setting Power Feed Rate

The feed rate chart on the upper right of the headstock face shows the settings for metric and inch feed rates.

Using the controls on the lathe, follow along with the example below to better understand how to set the lathe for the desired power feed rate.

Setting Power Feed Rate of 0.18mm/rev

1. Make sure the end gears are in the standard configuration, which is applicable for general feed operations (refer to **End Gears** on the next page for detailed instructions).

2. Locate the line in the feed rate chart that lists the setting for 0.18mm of feed per revolution of the spindle, as illustrated in **Figure 68**.

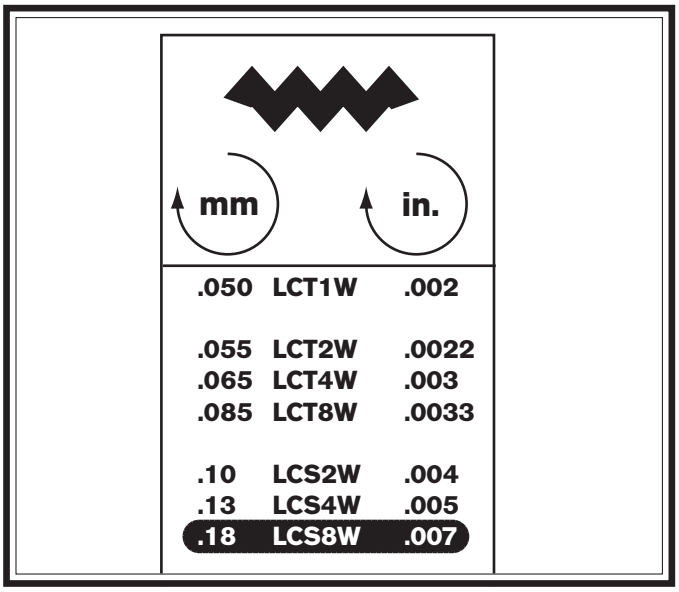


Figure 68. Feed rate chart.

3. The configuration string of characters to the right of the selected feed rate (**LCS8W**) displays the positions to set the feed controls for a feed rate of 0.18mm/rev. (see **Figure 68**).

NOTICE

When using power feed to move the cross slide, the feed rate is ½ the value stated in the feed rate chart.

Note: In the next step, use the chuck key to rock the spindle back-and-forth to help mesh the gears as you make adjustments.

4. Position the controls as directed by the configuration string as follows (see **Figure 69**):

L Move the feed range lever to the low (Low) position.

C Point the left quick-change gearbox lever to the **C**.

S Move the middle quick-change gearbox lever to the **S**.

8 Position the bottom gearbox lever in the **8** slot.

W Point the right gearbox lever to the **W**.

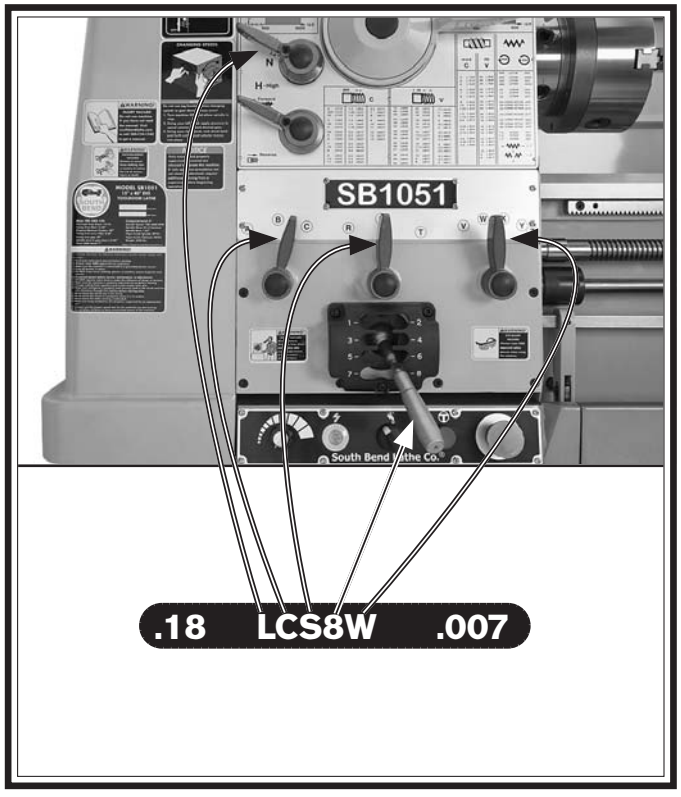


Figure 69. Power feed controls positioned for 0.18 mm/rev.

End Gears

The end gears can be setup for the standard or alternate configuration, depending upon the type of operation to be performed. The lathe is shipped with the end gears in the standard configuration.

Standard End Gear Configuration

Use the standard end gear configuration for inch threading, metric threading and all general feed operations.

In the standard configuration (see **Figure 70**), the 24T end gear is installed in the top position, the 44T/56T transposing gears in the middle position, and the 57T end gear in the bottom position. The 56T, 57T, and 24T gears are meshed.

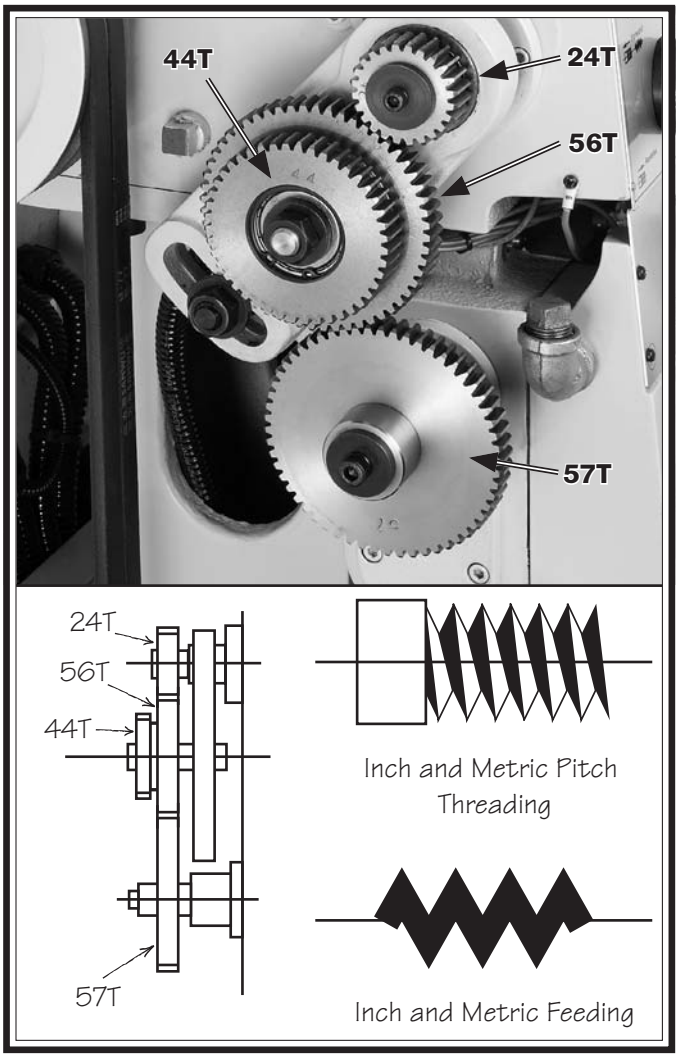


Figure 70. End gears in the standard configuration.

Alternate Configuration

Use the alternate end gear configuration for cutting modular or diametral threads. The 57T end gear is positioned on the outside so that it meshes with the 44T transposing gear instead of the 56T gear, as illustrated in **Figure 71**.

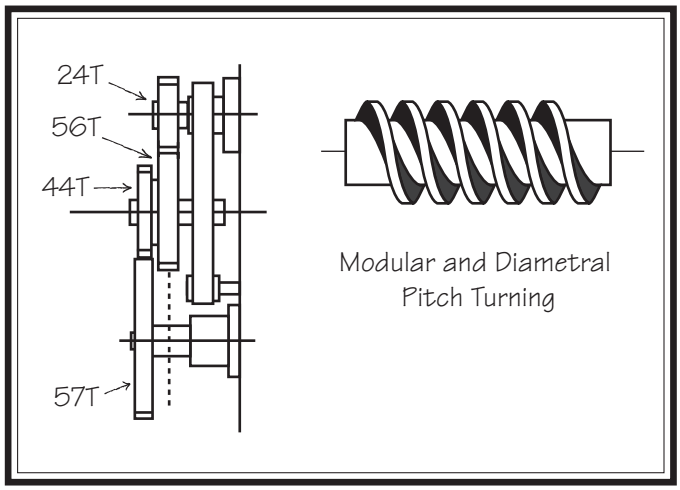


Figure 71. Alternate end gear configuration.

Configuring End Gears

Tools Needed	Qty
Hex Wrench 6mm	1
Wrench 22mm	1

To configure the end gears:

1. DISCONNECT LATHE FROM POWER!
2. Remove the headstock end gear cover.
3. Remove the cap screw, lock washer, and flat washer from the 57T end gear (see **Figure 72**).

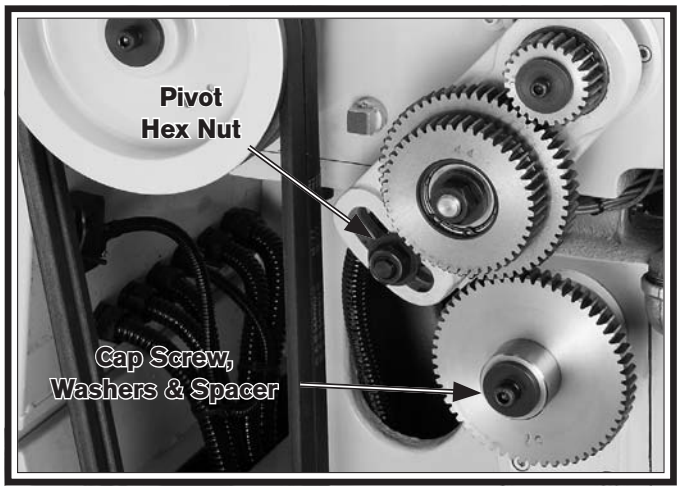


Figure 72. End gear components.

4. Loosen the pivot hex nut shown in **Figure 72**, then swing the pivot arm to the left so that 44T/56T gears are away from the 57T gear. Hand tighten the hex nut to keep the arm in place.
5. Use a stiff brush and mineral spirits to clean away the debris and grime from the gears and shafts, then lubricate these devices as instructed in the **End Gears** lubrication subsection on **Page 70**.
6. Making sure to keep the key seated in the shaft, remove the spacer and the 57T gear, then re-install them as follows:

   — For the standard end gear configuration, slide the 57T gear on first, then the spacer on the outside.

   — For the alternate end gear configuration, slide the spacer on first, then the gear.

7. Re-install the cap screw, lock washer, and flat washer you removed in **Step 3** to secure the spacer and 57T gear.

Note: DO NOT overtighten the cap screw—it merely holds the gear in place. Overtightening it will make it harder to remove later and may restrict the rotation of the gears.

8. Slide the pivot arm back in place to mesh the gears, keeping approximately 0.002" play between the gears, then retighten the pivot hex nut.
9. Replace and secure the end gear cover before connecting the lathe to power.

Threading

The following subsections describe how to use the threading controls and charts to set up the lathe to cut threads. If you are unfamiliar with how to cut threads on a lathe, we strongly recommend that you read books, review industry trade magazines—or get formal training before attempting any threading tasks.

Headstock Threading Controls

The threading charts on the headstock show the settings for metric, inch, modular, and diametral threading.

Using the controls on the lathe, follow along with the example below to understand how to set up the lathe headstock controls for threading.

Setting Metric Thread Pitch of 1.75

1. Make sure the end gears are in the standard configuration (refer to **End Gears** on **Page 52** for detailed instructions).

2. Locate the line in the metric thread chart that lists the setting for 1.75mm thread pitch, as illustrated in **Figure 73**.

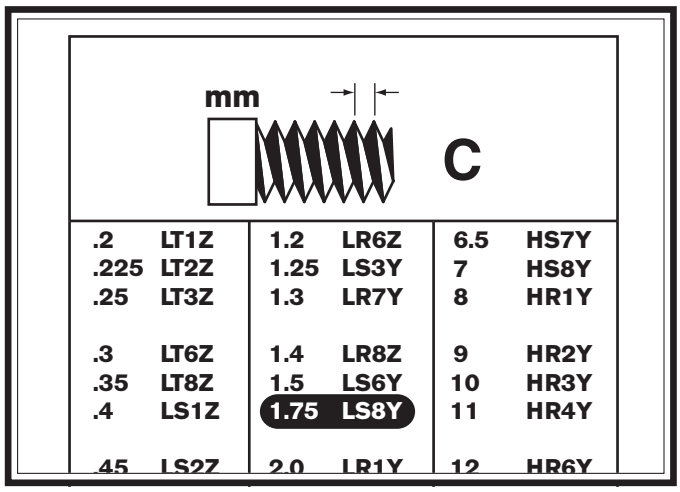


Figure 73. Metric thread chart with 1.75mm thread pitch highlighted.

3. The configuration string of characters to the right of the selected thread pitch (**LS8Y**) displays the positions to set the threading controls for a metric thread pitch of 1.75 (see **Figure 73**).

4. Position the controls as follows:

   Note: Each of the thread charts has a **C** or **V** in the header that is to be used for all of the listings in that chart. For the **C**, use the left quick-change gearbox lever, and for the **V** use the right.

   L Move the feed range lever to **Low**.

   S Point the middle quick-change gearbox lever to **S**.

   8 Position the bottom gearbox lever in the **8** slot.

   Y Point the right gearbox lever to **Y**.

The lathe is now set up to cut 1.75mm threads.

Apron Threading Controls

The half nut lever (see **Figure 74**) engages the carriage with the leadscrew, which moves the carriage and cutting tool along the length of the workpiece for threading operations.

Important: Make sure the feed selection lever is disengaged *before* attempting to engage the half nut.

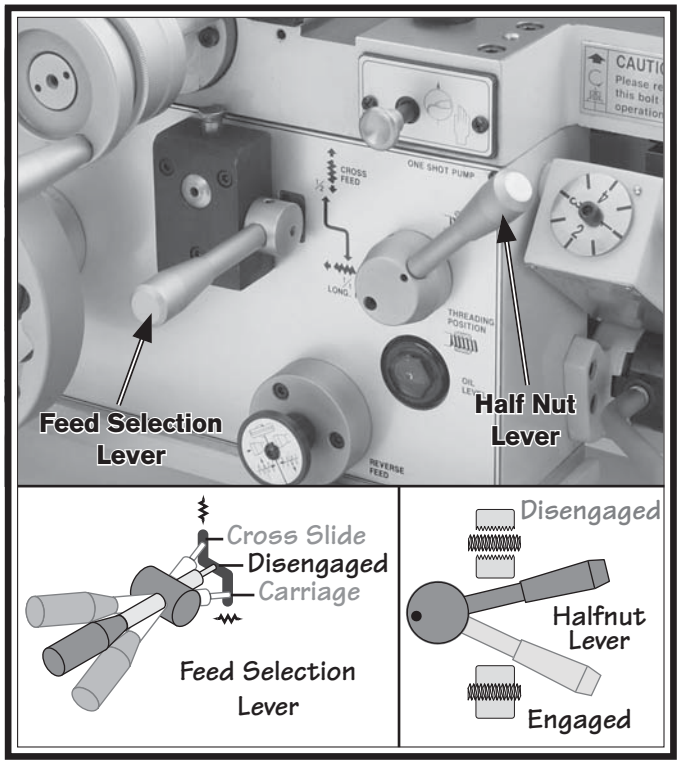


Figure 74. Apron threading controls.

Thread Dial

When inch threading, the numbers on the thread dial are used with the thread dial chart to show when to engage the half nut.

The thread dial gear must be engaged with the leadscrew for this to work (see **Figure 75**). To engage the dial gear, loosen the knurled knob on the thread dial, pivot the dial gear toward the leadscrew so that it properly meshes with the leadscrew threads, then re-tighten the knob.

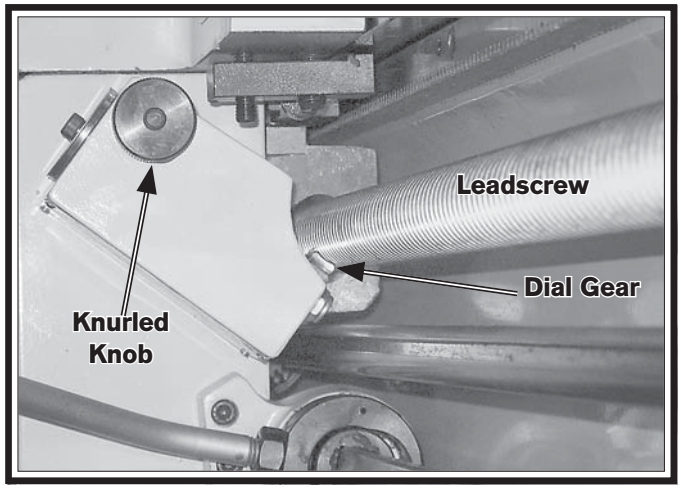


Figure 75. Dial gear engaged with the leadscrew.

NOTICE

When threading, we recommend using the slowest speed possible and avoiding deep cuts, so you are able to disengage the half nut when required and prevent an apron crash!

Thread Dial Chart

The thread dial chart (see **Figure 76**) can be found on the front of the thread dial housing. The dial number indicates when to engage the half nut for that specific thread pitch.

Find the TPI (threads per inch) that you want to cut in the left column of the thread dial chart, then reference the dial number to the right of it.

In.	
4,8,12,16,20,24, 28,32,36,40,44, 48,56,60,72	Any Position
2,6,10,14, 18,22,26, 30,54	Non-Numbered Position
3,5,7,9, 11,13,15, 19,23,27	Numbered Position 1,2,3,4
2½,3½,4½, 7½,11½,13½	Position 1,3 or 2,4
2¼,2¾, 3¼,3¾	Position 1 Only
2⅞	Same as Metric Threads

Figure 76. Thread dial chart.

Note: The thread dial is not used for metric threading, diametral pitches, or modular pitches. For these types of operations, you must leave the half nut engaged until the turning is complete.

The following examples explain how to use the thread dial chart.

TPI Divisible By 4

For threading a TPI that is divisible by four, use any line on the thread dial (see **Figure 77**).

TPI	
4,8,12,16,20,24, 28,32,36,40,44, 48,56,60,72	Any Position

Figure 77. Any position on the dial for threading TPI divisible by 4.

Even TPI Not Divisible By 4

For threading a TPI that is even but not divisible by 4, use any of the non-numbered lines on the thread dial (see **Figure 78**).

TPI	
2,6,10,14, 18,22,26, 30,54	Non-Numbered Position

Figure 78. Marks are selected on the dial for threading even TPI not divisible by 4.

Odd Numbered TPI

For odd numbered TPI, use any of the numbered lines on the thread dial (see **Figure 79**).

TPI	
3,5,7,9, 11,13,15, 19,23,27	Numbered Position 1,2,3,4

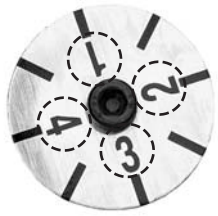


Figure 79. Numbers are selected on the dial for threading odd numbered TPI.

½ Fractional TPI

Use any opposing number pairs—2/4 or 1/3 on the thread dial for ½ fractional TPI (see **Figure 80**). For example, to cut a 3½ thread, select 1 or 3 on the dial.

TPI	
2½,3½,4½, 7½,11½,13½	Position 1,3 or 2,4

Figure 80. Opposing number group are selected on dial for cutting ½ thread TPI.

¼ or ¾ Fractional TPI

For TPI that have a ¼ or ¾ fraction, use position 1 on the thread dial (see **Figure 81**).

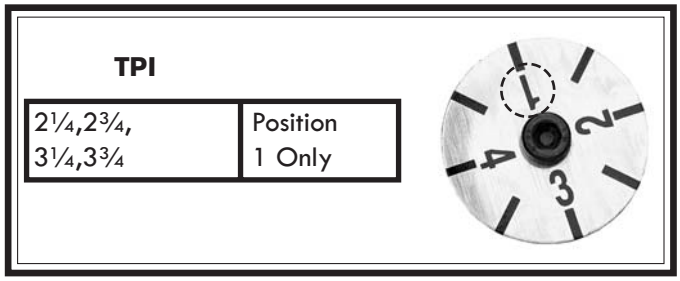


Figure 81. Position for ¼ or ¾ fractional TPI.

2⅞ TPI

The thread dial is not used for 2⅞ threads (see **Figure 82**). For this operation, you must leave the half nut engaged until the turning is complete.

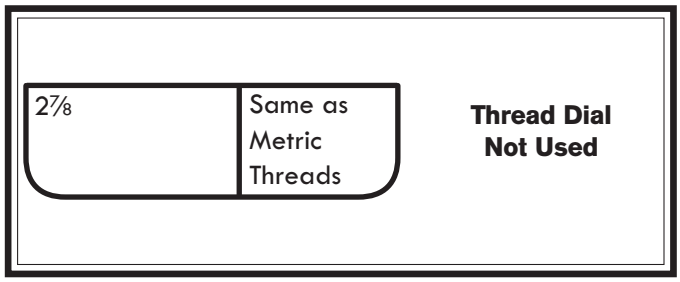


Figure 82. Half nut stays engaged for 2⅞ TPI.

Chip Drawer

The chip drawer catches swarf and metal chips during operation. A screen in the bottom prevents large chips from returning to the reservoir with the run-off coolant, which could cause damage to the pump.

The chip drawer slides open and is removable for cleaning (see **Figure 83**).

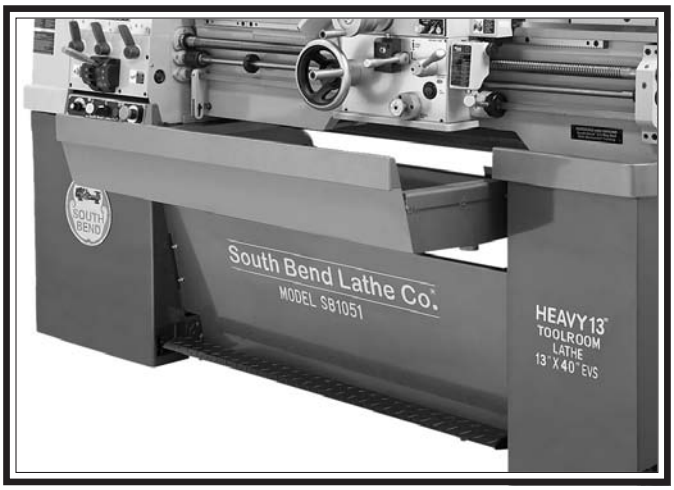


Figure 83. Chip drawer.

⚠CAUTION

The chip drawer is very heavy. Unless removing the chip drawer for cleaning, do not pull it out more than halfway; otherwise, it could fall out and cause a crushing injury. If removing the drawer for cleaning, get assistance!

Coolant System

When the coolant pump is turned ***ON*** and the valve lever (see **Figure 84**) is opened, fluid is delivered through the nozzle from the coolant tank. The valve lever controls the rate of fluid flow.

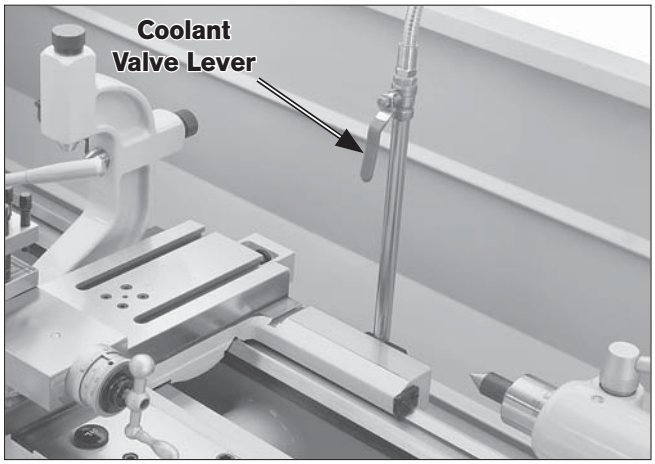
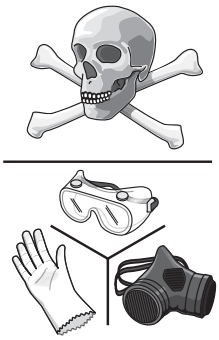


Figure 84. Coolant valve lever.

When adding coolant, always use a high quality product and follow the manufacturer's instructions for diluting. The quick reference table shown in **Figure 85** can help you select the appropriate fluid.

Refer to **Coolant System Service** on **Page 71** for detailed instructions on how to add or change fluid. Check the coolant regularly and promptly change it when it becomes overly dirty or rancid, or as recommended by the fluid manufacturer.



⚠WARNING

BIOLOGICAL & POISON HAZARD!

Use the correct personal protection equipment when handling coolant. Follow federal, state, and fluid manufacturer requirements for proper disposal.

NOTICE

Running the pump without adequate fluid in the coolant tank may permanently damage it. This is not covered under the warranty.

To use the coolant system on your lathe:

1. Make sure the coolant tank is filled with the appropriate amount of fluid.
2. Position the coolant nozzle for your operation.
3. Use the coolant pump switch on the control panel to turn the pump ***ON***.
4. Adjust the flow of coolant by using the valve lever near the base of the nozzle hose.

Important: Promptly clean any splashed fluid from the floor to avoid a slipping hazard.

Workpiece	Dry	Water Soluble Oil	Synthetic Coolants	Sulferized Oil	Mineral Oil
Aluminum		X	X		
Brass	X	X	X		
Bronze	X	X	X		X
Cast iron	X				
Low Carbon Steel		X	X		
Alloy Metals		X	X	X	X
Stainless Steel		X	X	X	X

General Note: Coolants are used for heavy-duty lathe operations and production turning. Oil-water emulsions and synthetic cutting fluids are the most common for typical lathe operations. Sulferized oils often are used for threading. For small projects, spot lubrications can be done with an oil can or brush, or omitted completely.

Figure 85. Coolant selection table.

Accessories

This section includes the most common accessories available for your lathe, which may be available through your local South Bend Lathe Co. dealer. If you do not have a dealer in your area, please call us at (360) 734-1540 or email us at **cs@southbendlathe.com**.

SB1279—10 Pc. Precision 5—C Collet Set
Set of 10 collets sized from ⅛" - ¾". Same quality as the individual collets, only packaged in one convenient set.

Figure 86. Model SB1279 10 Pc. 5-C Collet Set.

SB1264—Collect Attachment
This collet attachment takes advantage of the South Bend factory-made collet port in the lathe gear cover. It installs easily without requiring modification to the gear cover. Capable of delivering years of trouble-free service and manufactured with the same high-quality workmanship, materials, and tolerances South Bend machinery is known for.

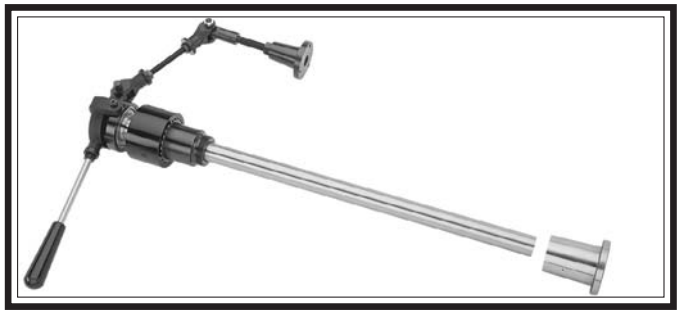


Figure 87. Model SB1264 Collect Attachment.

D1-5 Back Plates
SB1397—6¼"
SB1399—8¼"
SB1401—10½"
Sized to fit D1-5 spindles, these back plates are precision made and mount to your plain-back chuck with minimal modifications.

Figure 88. D1-5 Back Plate.

SB1263—Taper Attachment
This taper attachment mounts to the back of the lathe bedway and allows you to make accurate tapers of up to 12" without having to offset the tailstock or disengage the cross slide nut. Features scales at both ends that read in inches-per-foot and degrees. An angle adjusting knob with fine threads provides exacting control when setting tapers.

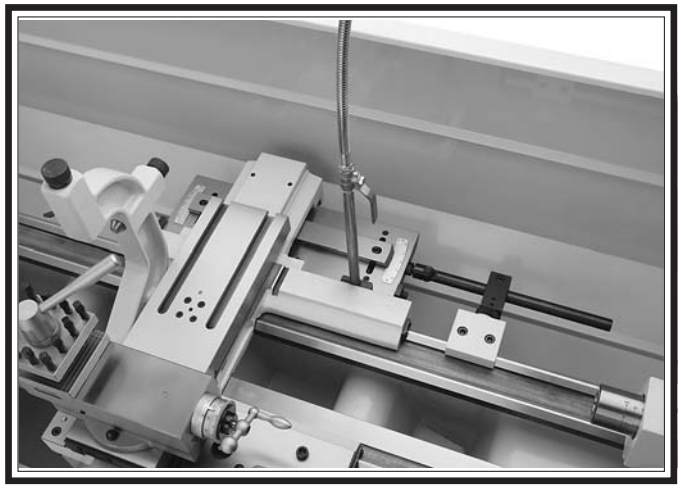


Figure 89. Model SB1263 Taper Attachment.

Keyless Integral Chucks
SB1379—MT #3 ½"
SB1380—MT #3 ⅝"
These keyless chucks are produced with an integral shank to maximize concentricity between the body, shank, and jaws. They start as a one-piece high-alloy body which is turned, then finish ground throughout, making them as close to zero TIR (Total Indicated Runout) as can be. Keyless chuck self-tightens, so a spanner wrench is provided to ease tool removal.

Figure 90. MT #3 Keyless Chuck.

SB1298—SBL Bench Lathe Shop Clock
SB1299—SBL Toolroom Lathe Shop Clock
SB1300—SBL Lathe with Man
These fine traditional shop clocks are constructed with a metal antique-finished frame. They are easy to read from a distance and measure 14" in diameter. Pictures just don't do them justice. They are very nice quality clocks and perfect for the South Bend Lathe aficionado.

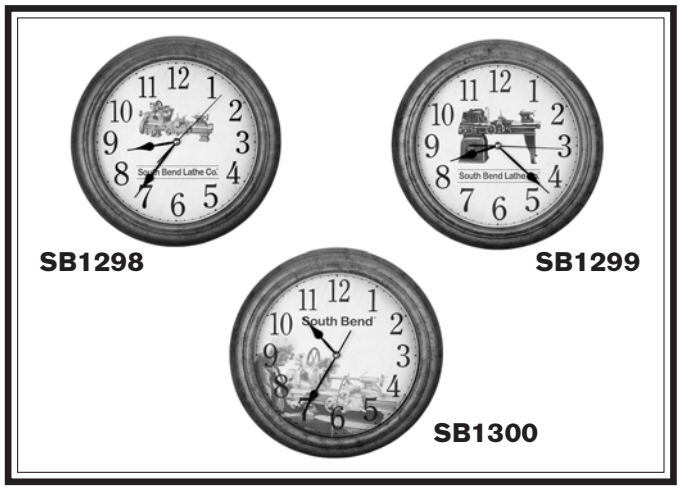


Figure 91. Antique-finished South Bend shop clocks.

SB1238—High Performance MT#3 Live Center
- Shafts are made of alloy steel and vacuum heat-treated to HRC60°±1 for high rigidity and durability.
- Centers use a combination of roller bearings, thrust bearings, and ball bearings.
- Waterproof design.

Figure 92. SB1238 High Performance Live Center.

SB1246—MT#3 Bull Nose Center
- Cr-Mo steel; hardened to HRC60 ± 1
- Taper roller & ball bearing construction
- Great for turning pipes

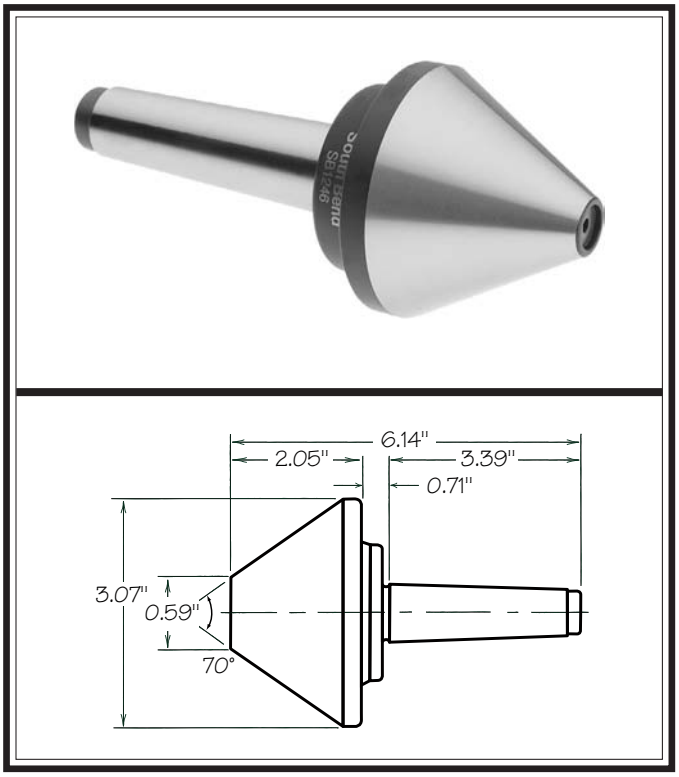


Figure 93. SB1246 MT#3 Bull Nose Center.

SB1365—Way Oil
Engineered for the high pressure exerted on horizontal or vertical ways and slides. Protects against rust and corrosion. Ensures stick-free, smooth motion which maximizes finishes and extends the life of your machine Won't gum up! 12 oz. AMGA#2 (ISO 68 equivalent)

Figure 94. SB1365 Way Oil.

SB1282—High Performance MT#3 Live Center Set
South Bend brand live centers are the best centers in the industry made with pride and uncompromising quality.

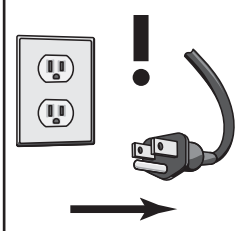
- Shafts are made of alloy steel and vacuum heat-treated to HRC60°±1 for high rigidity and durability.
- Centers use a combination of roller bearings, thrust bearings, and ball bearings.
- Waterproof design.

Figure 95. High Performance Live Center Set.

SB1251—Machinist's Oak Tool Box
Proudly made in the South Bend tradition, this heavy-duty oak tool chest will safeguard your finest tools for many years of dependable service. Solidly constructed with mortise and tenon joinery, this tool box features a locking top lid and front panel and 13 drawers of various sizes. Seven drawers even have removable dividers for organizing and protecting tools. All drawers and top compartment are felt-lined for added protection. The front panel secures all drawers when the top lid is latched or locked and neatly slides under the bottom drawer when accessing the drawers. All hardware is brass including the heavy-duty side handles. Weighs 65 lbs.

Figure 96. SB1251 Machinist's Oak Tool Box.

Maintenance Schedule



⚠WARNING

Always disconnect power to the machine before performing maintenance. Failure to do this may result in electrocution or accidental startup injury.

For optimum performance from this machine, this maintenance schedule must be strictly followed. We strongly recommend all operators make a habit of following the daily maintenance procedures. Use the chart provided on **Page 63** to help ensure this is done.

Ongoing

The condition of machine components should be carefully observed at all times to minimize the risk of injury or machine damage. If any of the conditions below are observed, stop the lathe immediately, disconnect power, and correct the condition before resuming operations:

- Loose mounting bolts or fasteners.
- Worn, frayed, cracked, or damaged wires.
- Guards removed.
- STOP button not working correctly or not requiring you to reset it before starting the machine again.
- A reduction in braking speed or efficiency.
- Oil level not visible in the sight glasses.
- Coolant not flowing out when coolant switch is ***ON*** and the valve is open.
- Damaged or malfunctioning components.

Daily, Before Operations

- Check/add headstock oil (**Page 64**).
- Check/add gearbox oil (**Page 66**).
- Check/add apron oil (**Page 67**).
- Check/add coolant (**Page 71**).
- Lubricate the ways (**Page 68**).
- Add oil to the ball oilers (**Page 69**).
- Clean/lubricate the leadscrew (**Page 68**).
- Disengage the feed selection lever on the apron (to prevent crashes upon startup).
- Ensure carriage lock bolt is loose.

Daily, After Operations

- Depress STOP button and shut ***OFF*** the master power switch (to prevent accidental startup).
- Vacuum/clean all chips and swarf from bed, slides, and chip drawer.
- Wipe down all unpainted or machined surfaces with an oiled rag.

Monthly

- Drain and clean the coolant tank, then add new fluid (**Page 71**).

Annually

- Change the headstock oil (**Page 64**).
- Change the apron oil (**Page 67**).
- Change the gearbox oil (**Page 66**).
- Lubricate end gears (**Page 70**).
- Check/level bedway (**Page 22**).

Cleaning & Protecting

Regular cleaning is one of the most important steps in taking care of this lathe. We recommend planning a cleaning routine into the workflow schedule, so that adequate time is set aside to do the job right.

Typically, the easiest way to clean swarf from the bed ways and chip drawer is to use a wet/dry shop vacuum that is dedicated for this purpose. Small chips left over after vacuuming can be wiped up with a slightly oiled rag. Avoid using compressed air to blow off chips, as it may drive them deeper into moving surfaces and could cause sharp chips to fly into your face or hands.

All unpainted and machined surfaces should be wiped down daily to keep them rust-free and in top condition. This includes any surface that is vulnerable to rust if left unprotected (especially any parts that are exposed to water-soluble coolant). Typically, a thin film of oil is all that is necessary for protection.

South Bend Lathe Co.® Lathe Monthly Maintenance Chart

Item \ Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Lubrication																															
Ways																															
Ball Oilers																															
Leadscrew																															
Unpainted Surfaces																															
Inspection																															
Headstock Oil Level																															
Gearbox Oil Level																															
Apron Oil Level																															
Coolant Level																															
Coolant Condition		**Refer to the coolant manufacture's instructions for more information regarding coolant condition, replacement, disposal, and safety.**																													

Use this chart to keep track of the maintenance performed on your South Bend Lathe. Cross out or initial the "Day" box for each item on the list. If the box is blacked out, maintenance is not required for that item on that day. Use the maintenance poster included with your South Bend Lathe as a quick reference guide when performing the maintenance items.

Annual Service

Once every year, or more often with heavy use, perform these service items. Keep track of when you last performed your annual service and when you'll need to perform it again.

Date of last annual service:	
Date of next annual service:	

Service Item	☑
Change Gearbox Oil	
Change Headstock Oil	
Change Apron Oil	
Change Coolant	

Make copies of this page to use each month. Keep each chart as a maintenance record for your South Bend Lathe.

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Lubrication

NOTICE

The following recommended lubrication schedules are based on light-to-medium usage. Keeping in mind that lubrication helps to protect the value and operation of the lathe, these lubrication tasks may need to be performed more frequently than recommended here, depending on usage.

Failure to follow reasonable lubrication practices as instructed in this manual could lead to premature failure of lathe components, which will not be covered under warranty.

Headstock

Oil Type .. Mobil DTE Light or ISO 32 Equivalent
Oil Amount ..... 6.4 Quarts
Check/Add Frequency ..... Daily
Change Frequency .....Annually

The headstock lubrication consists of an electric oil pump, low pressure kill switch, holding tank, oil lines, and distribution manifold. The distribution manifold directs a series of oil lines to key locations, to ensure that they remain well lubricated during operation.

The oil pump automatically turns ***ON*** and sends oil to the headstock components when the main power switch is turned ***ON*** and the STOP button is reset. This allows the headstock components to be fully lubricated before the spindle is started to protect the gears and spindle bearings against potential damage from dry starts.

Checking & Adding Oil

The sight glass on the side of the headstock oil tank (see **Figure 97**) shows the oil level and temperature—the bottom line represents the minimum oil level and the top line represents the maximum oil level. The lathe must be powered down with the STOP button to get an accurate reading on the oil level.

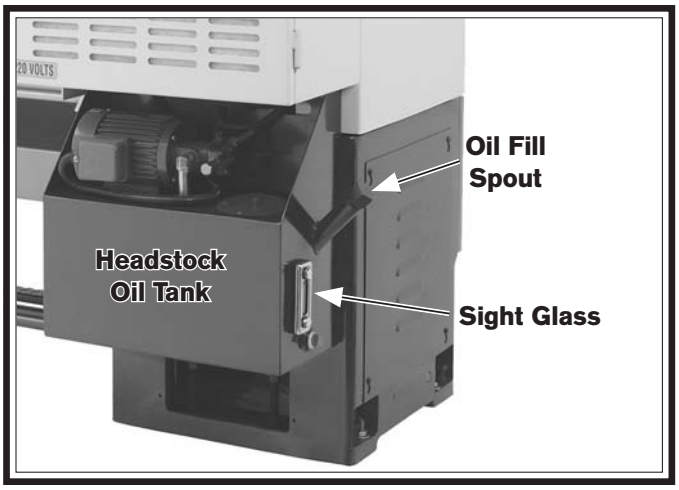


Figure 97. Headstock oil tank.

When the oil level approaches the minimum line, add enough oil to bring it up to the maximum line.

Monitoring Oil Temperature

During operations, regularly monitor the oil temperature shown in the sight glass in **Figure 97**. The temperature of the headstock oil must remain under 170° F or the oil will start to overheat and break down, causing it to lose its lubrication properties.

Under normal conditions, the oil should not reach 170° F; however, if it does, shut down the machine and allow the oil to cool. Investigate why the oil is getting excessively hot. Possibilities may be poor ventilation, excessive work loads, poor oil quality, oil is breaking down (losing lubricity) due to long term use, or extreme work site temperatures.

Correct the conditions causing the oil to get hot. If the oil is old or you suspect it is of poor quality, change it. If the work loads or working environment are extreme, reduce the duty cycle of the lathe to allow the oil to cool down when it gets hot.

If the oil temperature ever exceeds 170° F, change it to make sure the spindle bearings have high quality lubrication.

Verifying Oil Pump Operation

To prevent costly damage to the headstock gears and bearings, a kill switch will shut the lathe down if the oil pump stops working or the oil level is becomes too low. Verify the pump is working by looking at the sight glass shown in **Figure 98**. When working correctly, oil flows across the sight glass.

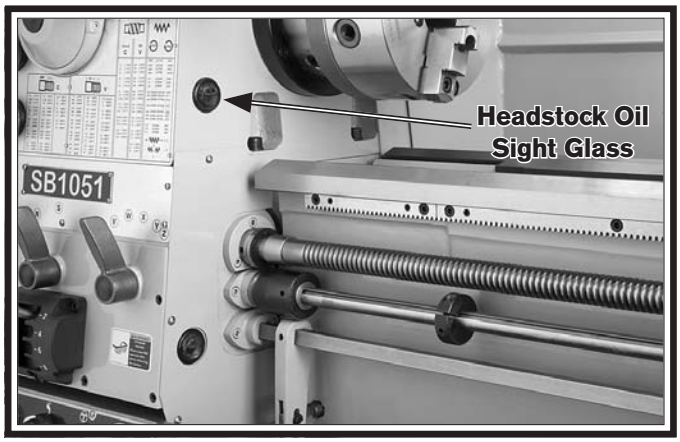


Figure 98. Location of the headstock oil sight glass.

Changing Headstock Oil

To ensure proper lubrication of headstock gears and spindle bearings, the headstock oil must be changed and the oil system cleaned after the **Spindle Break-In** (refer to **Page 28**) and annually thereafter (or every six months with heavy service or extreme working conditions).

Items Needed	Qty
Oil Catch Pan (5-Gallon)	1
Flexible Oil Funnel w/Hose	1
Wrench 12mm	1
Mineral Spirits	As Needed
Shop Rags	As Needed

To change the headstock oil:

1. Run the lathe at a medium speed for at least 10 minutes to warm the headstock oil.

2. DISCONNECT LATHE FROM POWER!

3. Put on safety goggles, rubber gloves, and a respirator to protect yourself from the contamination hazards of the oil.

4. Remove the side and rear motor access covers and the end gear cover.

5. Remove the three V-belts (refer to **V-Belts** on **Page 77** for detailed instructions).

6. Remove the oil cap from the top of the headstock (see **Figure 99**). This allows the oil to flow freely from the headstock in the next step.

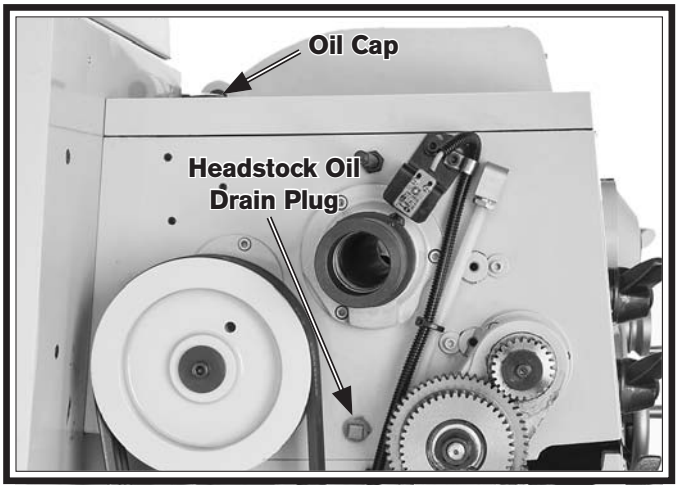


Figure 99. Headstock oil cap and drain plug.

7. With the help of an assistant, hold the flexible oil funnel and hose under the headstock oil drain plug and point it into the catch pan as you remove the drain plug. This will remove the standing oil in the headstock.

Tip: To eliminate the need to remove the V-belts when repeating this procedure in the future, install a ½" pipe of appropriate length and a cap in the place of the headstock oil drain plug. Make sure this pipe will not interfere when re-attaching the end gear cover.

8. Remove the oil fill spout cover, place the catch pan under the oil tank drain plug (see **Figure 100**), and remove the drain plug to empty the tank.

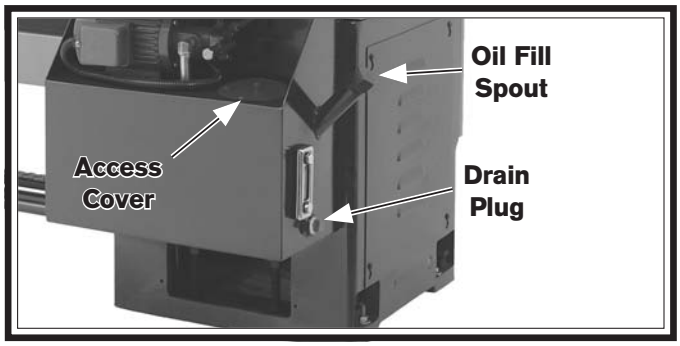


Figure 100. Headstock oil fill spout and drain plug.

9. Clean away grime and debris from the oil tank access cover (see **Figure 100**), then unthread the four cap screws to remove the cover.

10. Using mineral spirits and shop rags, thoroughly clean the inside of the oil tank. Make sure to soak up any excess mineral spirits to avoid contaminating the new oil.

11. Reach into the tank and remove the filter screen (see **Figure 101**) from the bottom of the suction pipe. Thoroughly clean it with mineral spirits and compressed air, allow to dry, and re-install it.

Figure 101. Suction pipe filter screen.

Tip: Place one or more magnets at the bottom of the tank to collect any fine metal particles. This will make cleaning easier the next time and reduce the risk of metal particles entering the pump.

12. Re-install the drain plug, fill the tank with oil, then re-install the fill spout cover.

Quick-Change Gearbox

Oil Type ..... Mobil Vactra 2 or ISO 68 Equivalent
Oil Amount ..... 1.4 Quarts
Check/Add Frequency ..... Daily
Change Frequency ..... Annually

Checking Oil Level

The gearbox reservoir has the proper amount of oil when the sight glass, shown in **Figure 102**, is approximately halfway full.

Figure 102. Location of quick-change gearbox oil sight glass.

Adding Oil

Use a 12mm wrench to remove the gearbox fill plug (see **Figure 103**). Add oil until the oil sight glass is approximately halfway full.

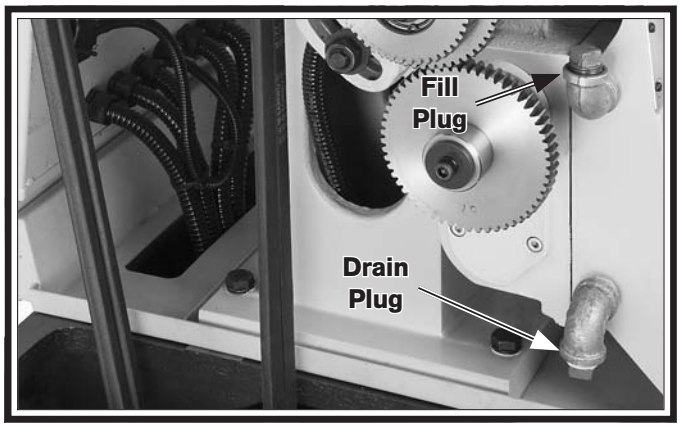


Figure 103. Locations of the quick-change gearbox fill and drain plugs.

Draining Oil

Place a catch pan under the quick-change gearbox drain plug (see **Figure 103**), use a 12mm wrench to loosen the fill plug, remove the drain plug, and allow the gearbox reservoir to empty.

Apron

Oil Type ..... Mobil Vactra 2 or ISO 68 Equivalent
Oil Amount ..... 1.2 Quarts
Check/Add Frequency ..... Daily
Change Frequency ..... Annually

Checking Oil Level

The apron oil sight glass is on the front of the apron, as shown in **Figure 104**. Maintain the oil volume so the oil sight glass is at least halfway full.

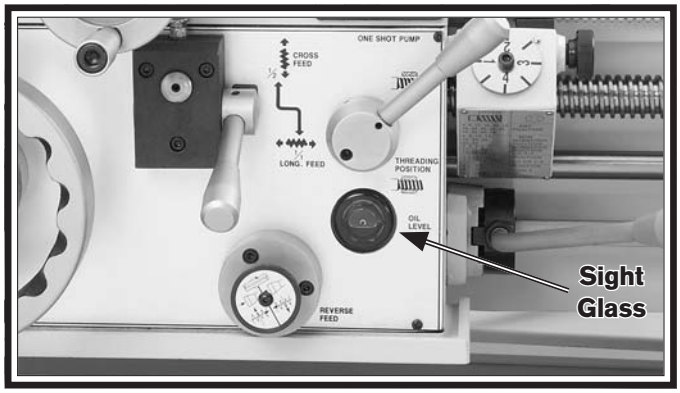


Figure 104. Location of apron oil sight glass.

Draining Oil & Flushing Reservoir

Since the apron oil reservoir supplies the one-shot oiler, the oil is constantly being refreshed when the reservoir is filled. However, over time, small metal particles may accumulate at the bottom of the reservoir. Therefore, to keep the reservoir clean, drain and flush it at least once a year.

Place a catch pan under the apron drain plug shown in **Figure 105**, loosen the fill plug on top of the apron (see **Figure 106**), then use a 5mm hex wrench to remove the drain plug and empty the reservoir.

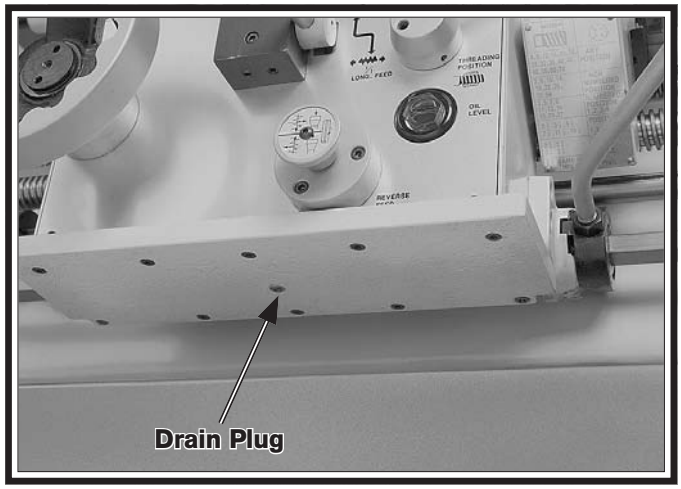


Figure 105. Location of apron drain plug.

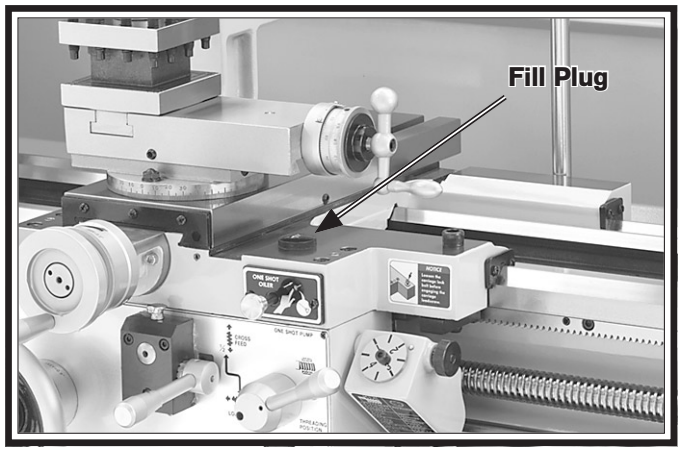


Figure 106. Location of apron fill plug.

Flush the reservoir by pouring a small amount of clean oil into the fill hole and allowing it to drain out the bottom.

Replace the drain plug and add oil as previously described.

One-Shot Oiler

The one-shot oiler shown in **Figure 107** lubricates the saddle ways with oil from the apron reservoir.

To use the one-shot oiler, pull the pump knob out for two or three seconds and then push it in. The pump draws oil from the apron reservoir and forces it to the way guides. Repeat this process while moving the carriage and cross slide through their full range of movement to distribute oil along the ways.

Lubricate the ways before and after operating the lathe. If the lathe is in a moist or dirty environment, increase the lubrication interval.

Check the apron oil level through the sight glass before using the one-shot oiler.

Figure 107. Location of one-shot oiler on the apron.

Longitudinal Leadscrew

Oil Type ..... Mobil Vactra 2 or ISO 68 Equivalent
Oil Amount ..... As Needed
Lubrication Frequency..... Daily

Before lubricating the leadscrew, clean it first with mineral spirits. A stiff brush works well to help clean out the threads. Make sure to move the carriage out of the way, so you can clean the entire length of the leadscrew.

Apply a thin coat of oil along the length of the leadscrew. Use a stiff brush to make sure the oil is applied evenly and down into the threads.

Note: In some environments, abrasive material can become caught in the leadscrew lubricant and drawn into the half nut. In this case, lubricate the leadscrew with a quality dry lubricant.

Ball Oilers & Oil Cup

Oil Type .. Mobil DTE Light or ISO 32 Equivalent
Oil Amount ..... 1 or 2 Squirts/Fill
Lubrication Frequency..... Daily

This lathe has seven ball oilers and one oil cup that should be oiled on a daily basis before beginning operation.

Proper lubrication of ball oilers is done with a pump-type oil can that has a plastic or rubberized cone tip. We do not recommend using metal needle or lance tips, as they can push the ball too far into the oiler, break the spring seat, and lodge the ball in the oil galley.

Lubricate the ball oilers before and after machine use, and more frequently under heavy use. When lubricating ball oilers, first clean the outside surface to remove any dust or grime. Push the rubber or plastic tip of the oil can nozzle against the ball oiler to create a hydraulic seal, then pump the oil can once or twice. If you see sludge and contaminants coming out of the lubrication area, keep pumping the oil can until the oil runs clear. When finished, wipe away any excess oil.

For the oil cup, lift the lid and fill the cup to the top. The oil will slowly drain into the gearing over time.

Refer to **Figures 108–110** and the following descriptions to identify the locations of each oil device.

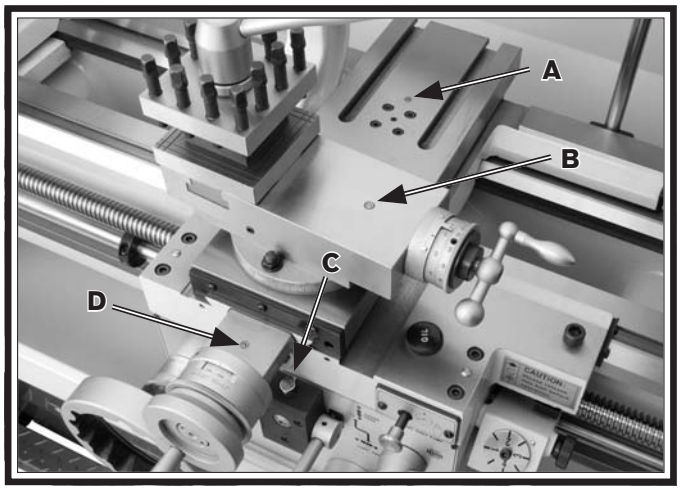


Figure 108. Carriage ball oilers and oil cup.

A. Cross Slide Leadscrew & Nut
B. Compound Rest Leadscrew & Nut
C. Feed Selection Lever Gearing
D. Cross Slide Leadscrew Bearing

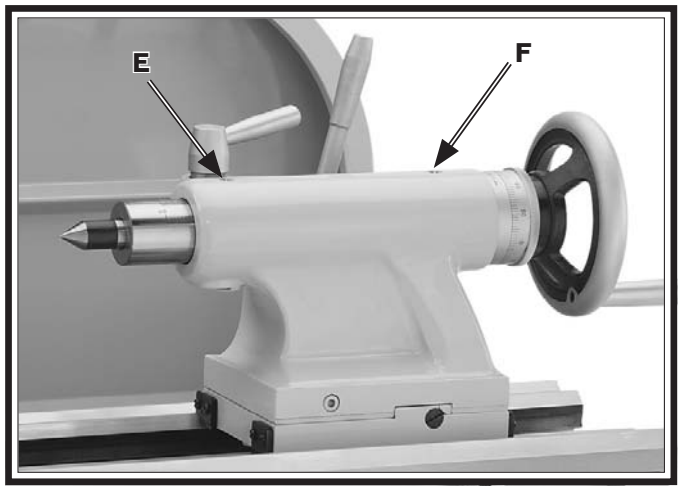


Figure 109. Tailstock ball oilers.

E. Quill Barrel
F. Quill Leadscrew & Nut

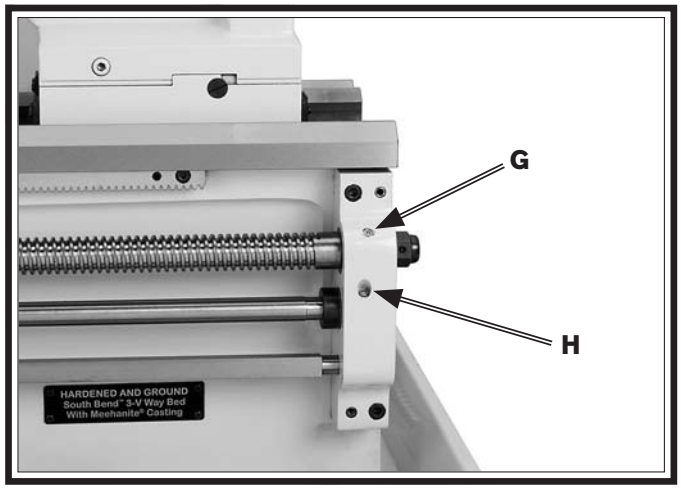


Figure 110. Leadscrew and feed rod end bearing ball oilers.

G. Leadscrew End Bearing
H. Feed Rod End Bearing

End Gears

Grease Type..... NLGI#2
Frequency ..... Annually or When Changing

The end gears, shown in **Figure 111**, should always have a thin coat of heavy grease to minimize corrosion, noise, and wear. Wipe away excess grease that could be thrown onto the V-belts and reduce optimal power transmission from the motor.

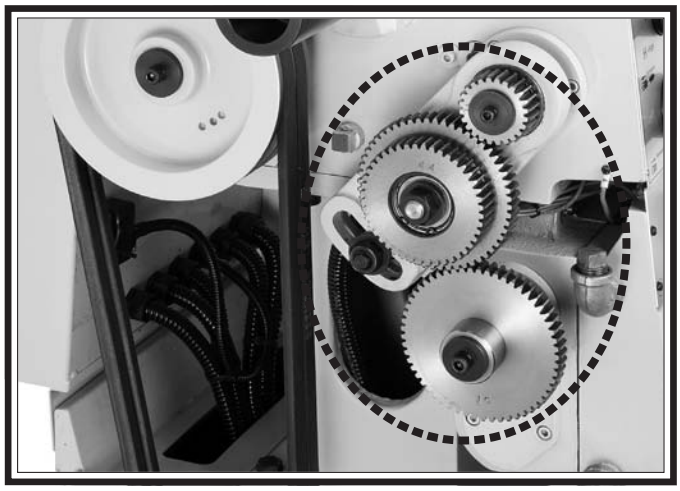


Figure 111. End gears.

Handling & Care

Make sure to clean and lubricate any gears you install or change. Be very careful during handling and storage—the grease coating on the gears will easily pickup dirt or debris, which can then spread to the other gears and increase the rate of wear.

Make sure the end gear cover remains installed whenever possible to keep the gears free of dust or debris from the outside environment.

Lubricating

1. DISCONNECT LATHE FROM POWER!
2. Remove the end gear cover and all the end gears shown in **Figure 111**.
3. Clean the end gears thoroughly with mineral spirits to remove the old grease. Use a small brush if necessary to clean between the teeth.
4. Clean the shafts, and wipe away any grease splatters in the vicinity and on the inside of the end gear cover.
5. Using a clean brush, apply a thin layer of grease on the gears. Make sure to get grease between the gear teeth, but do not fill the teeth valleys.
6. Install the end gears and mesh them together with an approximate 0.002" play. Once the gears are meshed together, apply a small dab of grease between them where they mesh together—this grease will be distributed when the gears rotate and re-coat any areas scraped off during installation.
7. Re-install the end gear cover before re-connecting the lathe to power.

Coolant System Service

The coolant system consists of a fluid tank, pump, and flexible nozzle. The pump pulls fluid from the tank and sends it to the valve, which controls the flow of coolant to the nozzle. As the fluid leaves the work area, it drains back into the tank through the chip drawer and catch tray where the swarf is screened out.

Use **Figures 112–113** to identify the locations of the coolant system controls and components.

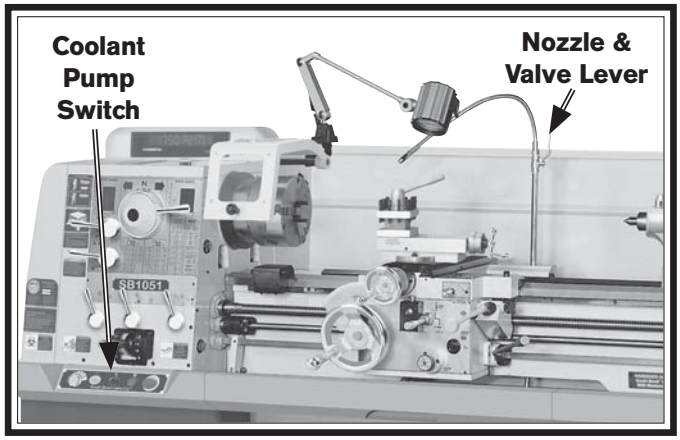


Figure 112. Coolant controls.

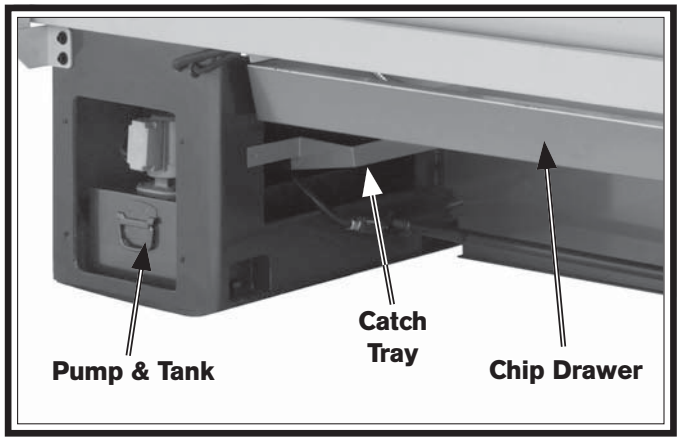


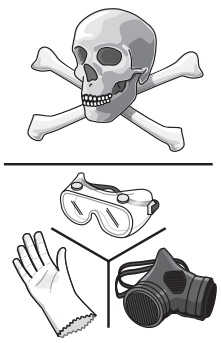
Figure 113. Additional coolant components.

Although most swarf from machining operations is screened out of the coolant before it returns to the tank, small particles will accumulate in the bottom of the tank in the form of sludge. To prevent this sludge from being pulled into the pump and damaging it, the pump's suction tube is positioned a couple inches from the bottom of the tank and fitted with a fine screen. This works well when the tank is regularly cleaned; however, if too much sludge is allowed to accumulate before the tank is cleaned, the pump will inevitably begin sucking it up.

Hazards

As coolant ages and gets used, dangerous microbes can proliferate and create a biological hazard. The risk of exposure to this hazard can be greatly reduced by replacing the old fluid on a monthly basis, or as indicated by the fluid manufacturer.

The important thing to keep in mind when working with the coolant is to minimize exposure to your skin, eyes, and lungs by wearing the proper PPE (Personal Protective Equipment), such as splash-resistant safety goggles, long-sleeve waterproof gloves, protective clothing, and a NIOSH-approved respirator.



⚠WARNING

BIOLOGICAL & POISON HAZARD!

Use the correct personal protection equipment when handling coolant. Follow federal, state, and fluid manufacturer requirements for proper disposal.

Adding Fluid

1. DISCONNECT LATHE FROM POWER!

2. Remove the vented access cover from the rear of the right stand, then slide the tank out, as shown in **Figure 114**.

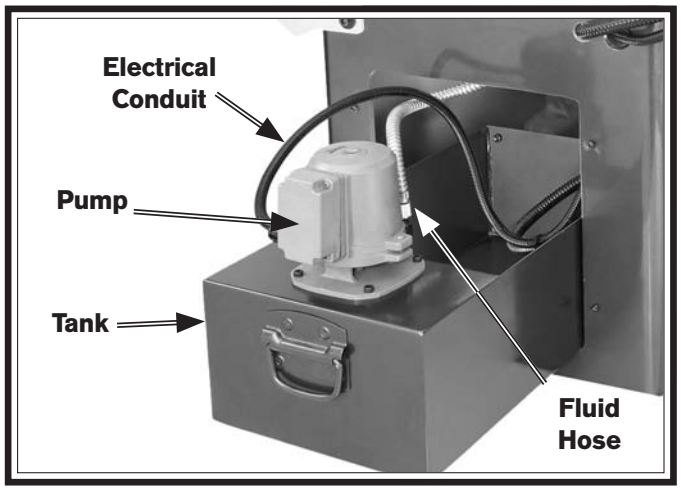


Figure 114. Coolant tank and pump.

3. Pour coolant into the tank until it is nearly full.

4. Slide the tank back into the cabinet and replace the access cover.

Changing Coolant

When you replace the old coolant, take the time to thoroughly clean out the chip drawer, catch tray, and fluid tank. The entire job only takes about a ½ hour when you are prepared with the proper materials and tools. Make sure to dispose of old fluid according to federal, state, and fluid manufacturer's requirements.

Items Needed:	**Qty**
Safety Wear	See **Hazards** on **Page 71**
New Coolant	11 Quarts (10.5 Liters)
Empty 5-Gallon Bucket w/Lid	2
Phillips Screwdriver #2	1
Wrench ¾"	1
Disposable Shop Rags	As Needed
Hose or Tubing ⅝" x 60" (Optional)	1 Piece
Magnets (Optional)	As Many As Desired

To change the coolant:

1. Position the coolant nozzle over the back of the backsplash so that it is pointing behind the lathe.

2. Place the 5-gallon bucket behind the lathe and under the coolant nozzle. If you are using the optional hose, connect it to the nozzle and place it in the bucket. Otherwise, you may need to have another person hold the bucket up to the nozzle to prevent coolant from splashing out.

3. Turn the coolant pump ***ON*** and pump the old fluid out of the reservoir. Turn the pump ***OFF*** immediately after the fluid stops flowing.

NOTICE

Running the coolant pump without adequate fluid in the tank may permanently damage it, which will not be covered under warranty.

4. DISCONNECT LATHE FROM POWER!

5. Remove the vented access cover from the rear of the right stand, then slide the tank out.

6. To enable the remaining fluid to be poured out in the next step, disconnect the fluid hose from the pump (see **Figure 114**).

Note: The electrical conduit was purposely left long, so the tank can be removed and dumped out without disconnecting the wires from the pump.

7. Pour the remaining coolant into the 5-gallon bucket and close the lid.

8. Clean all the sludge out of the bottom of the tank and then flush it clean. Use the second bucket to hold the waste and make sure to seal the lid closed when done.

   Dispose of the old coolant and swarf according to federal, state, and fluid manufacturer's requirements.

9. Slide the tank partially into the base and re-connect the fluid hose.

Tip: Leave one or more magnets at the bottom of the tank to collect metal chips and make cleanup easier next time. This will also help keep small metal chips out of the pump.

10. Refill the tank with new coolant, then slide it completely into the base.

11. Replace the access cover panel.

12. Re-connect the lathe to power and point the nozzle into the chip drawer.

13. Turn the master power switch ***ON***, then reset the STOP button.

14. Turn the coolant pump ***ON*** to verify that fluid cycles properly, then turn it ***OFF***.

Machine Storage

To prevent the development of rust and corrosion, the lathe must be properly prepared if it will be stored for a long period of time. Doing this will ensure the lathe remains in good condition for later use.

To prepare the lathe for storage:

1. Run the lathe and bring all gearboxes to operating temperature, then drain and refill them with clean oil.

2. Pump out the old coolant, then add a few drops of way oil and blow out the lines with compressed air.

3. DISCONNECT LATHE FROM POWER!

4. Thoroughly clean all unpainted, bare metal surfaces, then apply a liberal coat of way oil, heavy grease, or rust preventative. Take care to ensure these surfaces are completely covered but that the rust preventative or grease is kept off of painted surfaces.

5. Lubricate the machine as outlined in the lubrication section. Be sure to use an oil can to purge all ball oilers and oil passages with fresh oil.

6. Loosen or remove the V-belts so they do not become stretched during the storage period. (Be sure to place a maintenance note near the power button as a reminder that the belts have been loosened or removed.)

7. Place a few moisture absorbing desiccant packs inside of the electrical box.

8. Cover the lathe and place it in a dry area that is out of direct sunlight and away from hazardous fumes, paint, solvents, or gas. Fumes and sunlight can bleach or discolor paint and make the chuck guard cloudy.

9. Every few months, rotate by hand all gear-driven components a few times in several gear selections. This will keep the bearings, bushings, gears, and shafts well lubricated and protected from corrosion—especially during the winter months.

Slide the carriage, micrometer stop, tailstock, and steady rest down the lathe bed to make sure that way spotting is not beginning to occur.

Backlash Adjustment

Backlash is the amount of free play felt while changing rotation directions with the handwheel. This can be adjusted on the compound rest and cross slide leadscrews. Before beginning any adjustment, make sure that all associated components have been cleaned and lubricated.

NOTICE

Reducing backlash to less than 0.002" is impractical and can lead to accelerated wear of the wedge, nut, and leadscrew. Avoid the temptation to overtighten the backlash set screw while adjusting.

Compound Rest

Tools Needed: **Qty**

Hex Wrench 3mm 1

The compound rest backlash is adjusted by tightening the set screws shown in **Figure 115**. When these screws are adjusted against the leadscrew nut, they offset part of the nut to remove play between the nut and leadscrew.

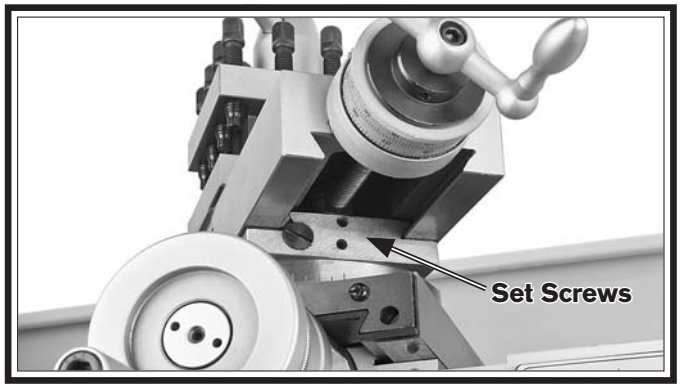


Figure 115. Compound rest backlash adjustment set screws.

To adjust the backlash, rock the handwheel back and forth, and tighten the screws slowly until the backlash is approximately 0.002"–0.003", as indicated on the graduated dial.

If you end up adjusting the nut too tight, loosen the set screws, tap the compound rest a few times with a rubber or wooden mallet, and turn the handwheel slowly back and forth until it moves freely—then try again.

Cross Slide

Tools Needed: **Qty**

Hex Wrench 3mm 1
Hex Wrench 5mm 1

The cross slide backlash is adjusted by loosening all four cap screws shown in **Figure 116**, then tightening the center set screw. This will push down on a wedge and force the leadscrew nut apart, taking up lash between the nut and leadscrew.

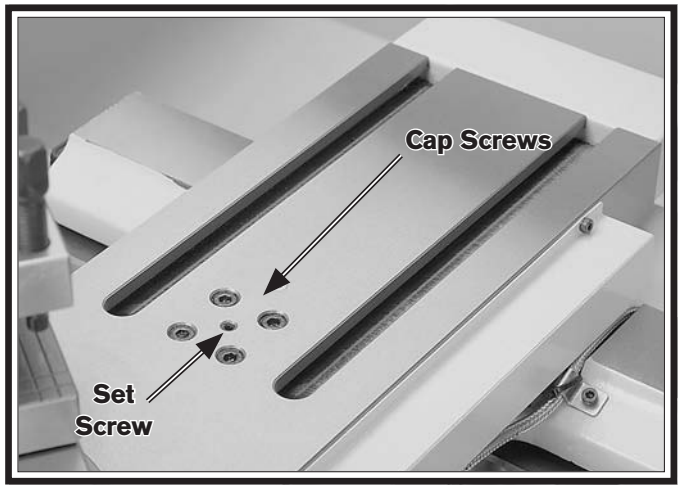


Figure 116. Cross slide backlash adjustment screws.

To adjust the backlash, remove the compound rest and loosen the four cap screws. Then, rock the cross slide handwheel back and forth, and tighten the set screw slowly until the backlash is at approximately 0.002"–0.003" as indicated on the graduated dial.

If you end up adjusting the nut too tight, loosen the set screw, tap the cross slide a few times with a rubber or wooden mallet, and turn the handwheel slowly back and forth, until the handle turns freely—then try again.

Remember to re-tighten the four cap screws when you are finished.

Leadscrew End Play Adjustment

After a long period of time, you may find that the leadscrew develops a small amount of end play. This end play can be removed with an easy adjustment.

Tools Needed:	**Qty**
Hex Wrench 3mm	1
Wrench 24mm	1

To remove leadscrew end play:

1. DISCONNECT LATHE FROM POWER!

2. Loosen the two set screws in the leadscrew end nut (see **Figure 117**).

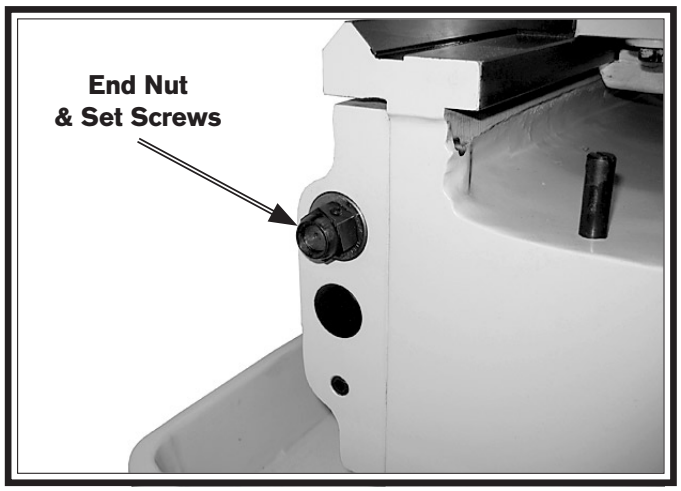


Figure 117. Leadscrew end nut.

3. Engage the half nut with the leadscrew.

4. Use the handwheel to move the carriage slightly toward the tailstock, then tighten the end nut at the same time until the end play is removed.

5. Retighten both set screws.

Gib Adjustment

The goal of adjusting the gib screws is to remove sloppiness or "play" from the ways without over-adjusting them to the point where they become stiff and difficult to move.

In general, loose gibs cause poor finishes and tool chatter; however, over-tightened gibs cause premature wear and make it difficult to turn the handwheels.

Important: Before adjusting the gibs, loosen the locks for the device so that the gibs can freely slide during adjustment, then lubricate the ways.

The gibs are tapered and held in position by a screw at each end. To adjust the gib, turn one screw ¼ turn clockwise and the other screw ¼ turn counterclockwise, so both screws move in the same direction and the same amount. Test the feel of the sliding component by turning the handwheel, and adjust the gib screws as necessary to make it tighter or looser.

The gib adjustment process usually requires some trial-and-error. Repeat the adjustment process as necessary until you find the best balance between loose and stiff movement. Most machinists find that the ideal gib adjustment is one where a small amount of drag or resistance is present, yet the handwheels are still easy to move.

Figures 118–122 show the location of the adjustment screws for each gib on this machine.

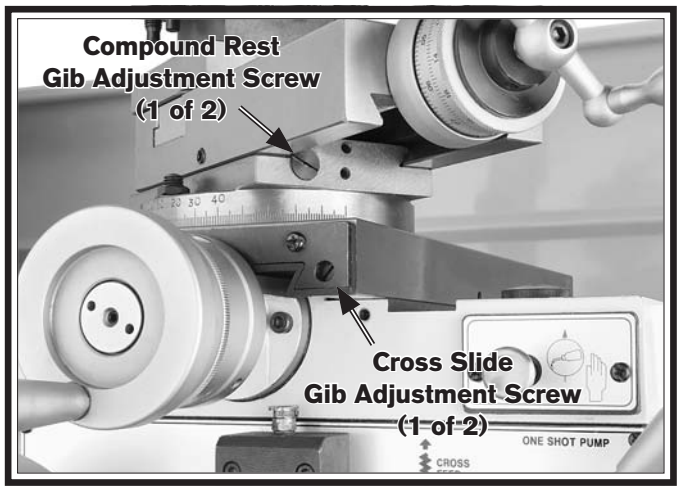


Figure 118. Compound and cross slide gib adjustment screws.

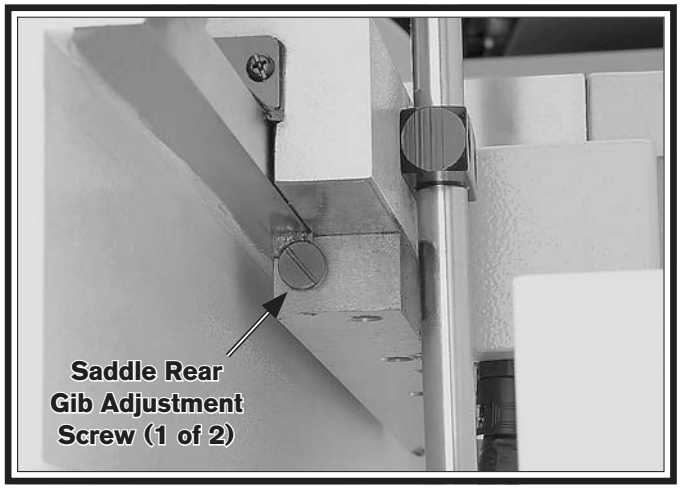


Figure 119. One of two rear saddle gib adjustment screws.

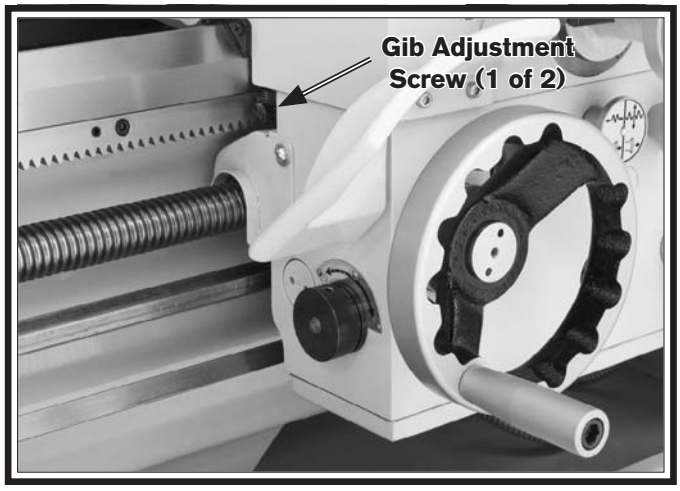


Figure 120. Front saddle gib adjustment screw.

Note: Remove the thread dial body and the carriage lock clamp to access the saddle gib adjustment screw on the tailstock side (see **Figure 121**).

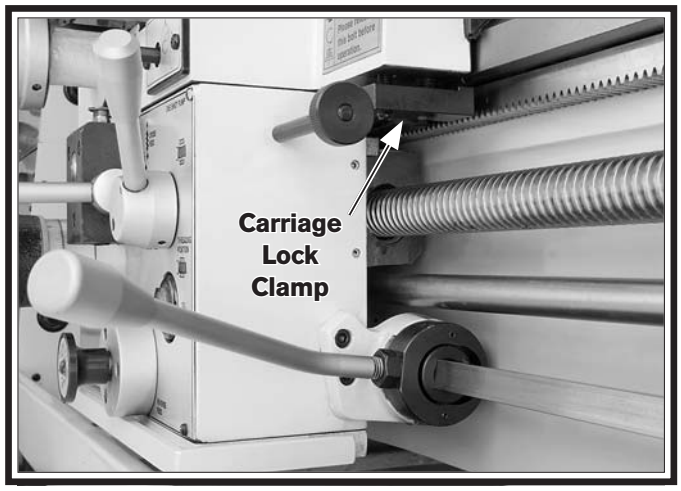


Figure 121. Carriage lock clamp.

Note: Before adjusting the tailstock gib, loosen the clamping hex bolts underneath both ends of the tailstock (see **Figure 122**) to release the clamping pressure between the upper and lower castings. Test the gib adjustment by using the offset adjustment screws. When you are satisfied with the setting, retighten the clamping hex bolts.

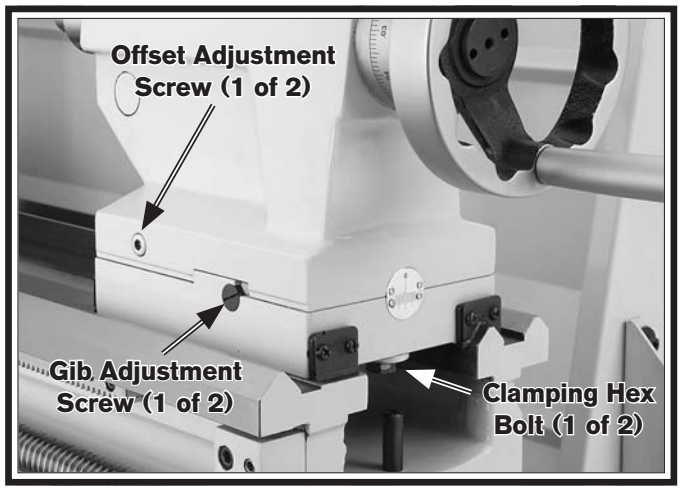


Figure 122. Tailstock gib adjustment controls.

Half Nut Adjustment

The clamping pressure of the half nut is fully adjustable with a gib that can be loosened or tightened by two set screws. Use this procedure to adjust the half nut if it becomes loose from wear, or it is too tight for your preferences. A half nut that is too loose will make it difficult to produce accurate work. A half nut that is too tight will increase the rate of wear on itself and the leadscrew.

Tool Needed:	**Qty**
Hex Wrench 3mm	1

To adjust the half nut:

1. Disengage the half nut, then remove the thread dial.

2. Turn the two set screws (see **Figure 123**) clockwise to tighten the half nut and counterclockwise to loosen it.

Note: Make sure to turn the set screws in even amounts so that one end of the gib does not become tighter than the other.

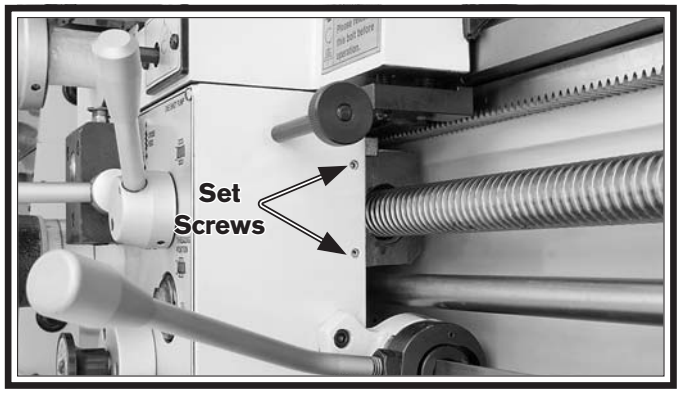


Figure 123. Half nut gib adjustment.

3. Engage/disengage the half nut several times and notice how it feels. The half nut is correctly adjusted when it has a slight drag while opening and closing. The movement should not be too stiff or too sloppy.

4. Repeat **Steps 2–3**, if necessary, until you are satisfied with the half nut pressure.

5. Re-install the thread dial.

V-Belts

V-belts stretch and wear with use, so check the tension on a monthly basis to ensure optimal power transmission. Replace all of the V-belts as a matched set if any of them show signs of glazing, fraying, or cracking (when the V-belt tension is relieved, the V-belts easily roll off the pulleys).

Tools Needed:	**Qty**
Phillips Screwdriver #2	1
Open End Wrench 24mm	1

To adjust V-belts tension:

1. DISCONNECT LATHE FROM POWER!

2. Remove the motor access covers shown in **Figure 124**.

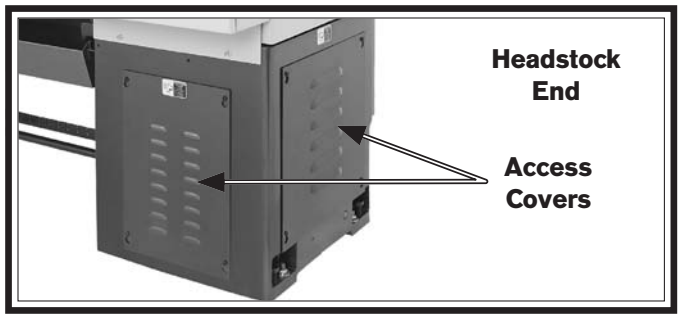


Figure 124. Locations of motor access covers.

3. Adjust the hex nuts on the motor mount bolts shown in **Figure 125** to move the motor mount plate up or down and adjust the V-belt tension. When correctly tensioned, each belt should have about ¾" deflection when pressed firmly (see **Figure 125**).

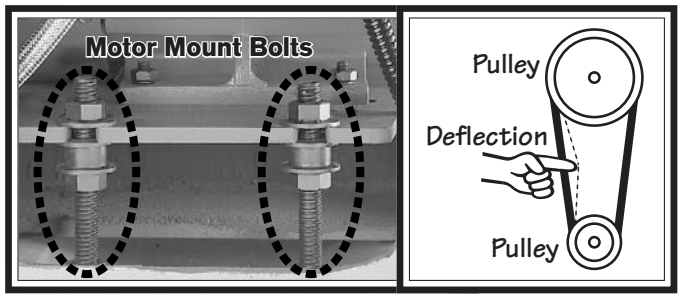


Figure 125. V-belt adjustment.

4. Tighten the hex nuts against both sides of the motor mount plate to prevent it from moving out of adjustment during operation, then re-install the access covers.

Brake & Switch

As the brake lining wears, the foot pedal develops more travel. If the brake band is not adjusted to compensate for normal wear, the limit switch will still turn the lathe off, but the spindle will not stop as quickly. It is especially important that the brake is kept properly adjusted so you can quickly stop the spindle in an emergency.

Tools Needed: **Qty**
Phillips Screwdriver #2 1
Hex Wrench 6mm 1

To adjust the brake and brake switch:

1. DISCONNECT LATHE FROM POWER!

2. Put on a respirator and eye protection to protect yourself from hazardous brake dust.

3. Remove the motor access panel from the left cabinet.

4. Measure the remaining brake band lining at the thinnest point, which is usually at the 8 o'clock position, as shown in **Figure 126**.

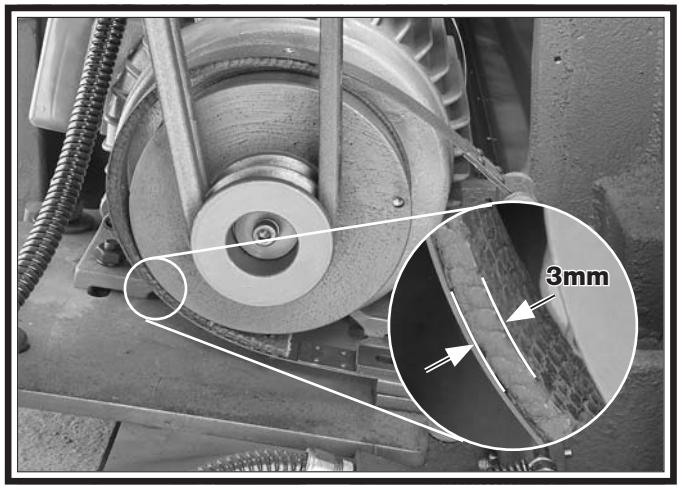


Figure 126. Minimum brake belt thickness.

When the brake band is new, the lining is approximately 6mm thick. If the lining thickness wears to 3mm or less, the brake band must be replaced. Otherwise, the rivets that secure the lining to the band will soon grind into the brake hub. If the hub becomes damaged, it must be replaced.

5. Remove the pedal stop shown in **Figure 127**.

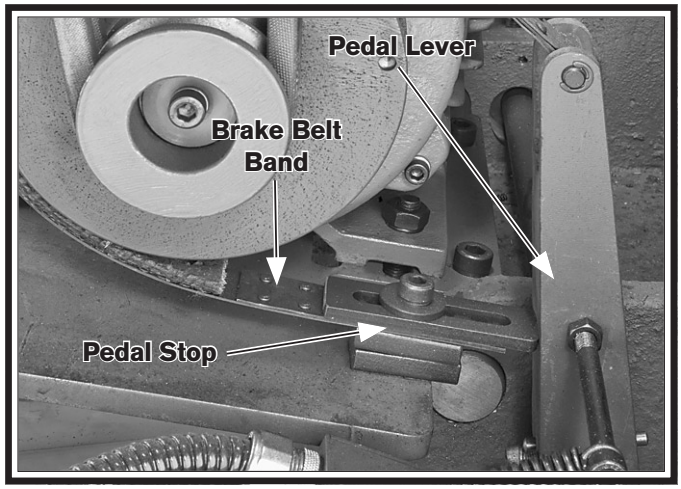


Figure 127. Brake belt adjustment components.

6. Move the brake band to the right one hole, and re-install the pedal stop, tightening the cap screw until it is just snug.

Note: If installing a new brake band, install the cap screw so there is one hole to the left for future brake adjustment.

7. Firmly push the pedal lever to the right until it stops and the brake band is fully clamped around the brake hub.

8. Tap the pedal stop into position so there is approximately a 25mm gap between the pedal lever and the stop (see **Figure 128**), then firmly tighten the pedal stop cap screw.

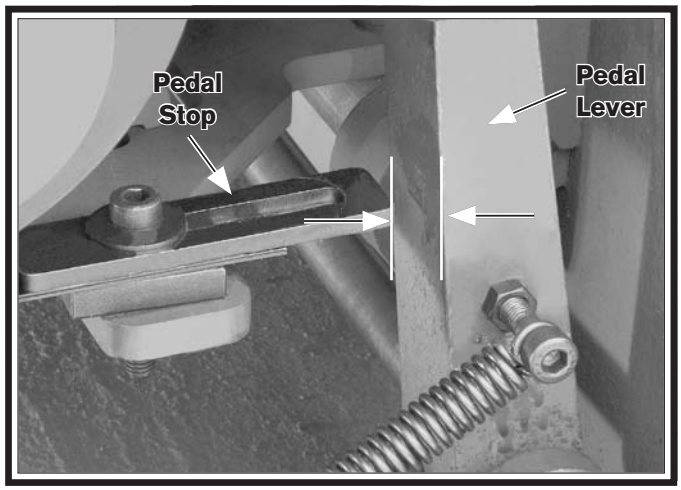


Figure 128. Brake pedal travel adjustment.

9. Locate the brake switch shown in **Figure 129**.

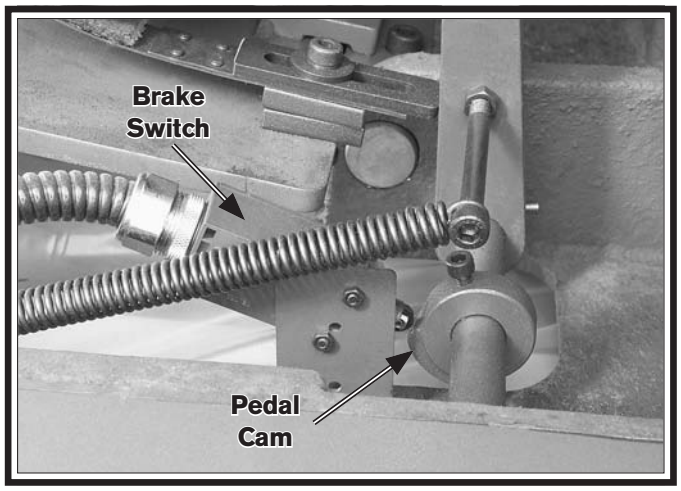


Figure 129. Brake switch and pedal cam.

10. Push the pedal lever down to verify that the cam lobe pushes the brake switch plunger in. When pushed in, the switch should click.

— If the switch does not click, loosen the switch mounting screws, push the brake pedal all the way down, and move the switch closer to the lobe until it clicks. Secure the switch in place at this location.

Note: In the released position, there should be an approximate 3mm gap between the switch plunger and the cam lobe.

11. Re-install the motor access panel, connect the lathe to power, then test the brake pedal. If you are not satisfied with the brake performance, repeat this procedure until you are.

Leadscrew Shear Pin Replacement

The leadscrew is secured to a connecting collar that is part of the headstock drivetrain with the use of a soft-metal shear pin. The shear pin is designed to break and disengage the power transfer to the leadscrew to help protect more expensive lathe components in the case of a carriage crash or the lathe is overloaded.

Contact South Bend to order a replacement shear pin (Part Number PSB10121234) or use the specifications in **Figure 130** to fabricate your own.

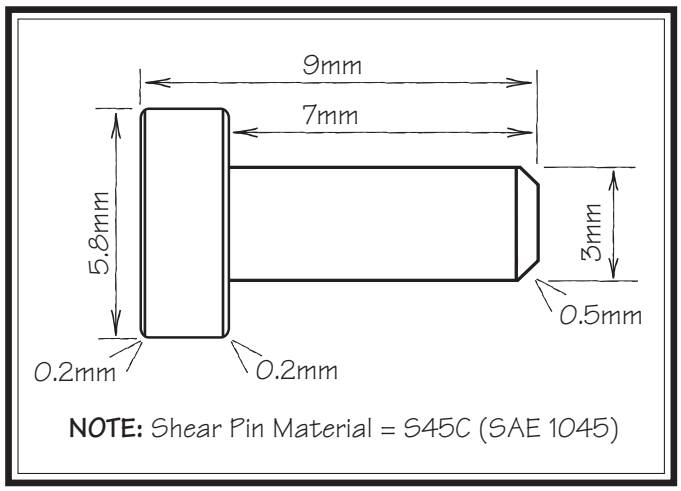


Figure 130. Shear pin specifications.

Tools Needed:	**Qty**
External Retaining Ring Pliers #1	1
Magnet	1
Safety Goggles	1
Blow Gun w/Compressed Air	1
Light Machine Oil	As needed

NOTICE

If you fabricate your own shear pin, make sure to use the material and dimensions specified in Figure 130. Otherwise, the shear pin may not provide the intended protection and lathe damage could result.

To replace the shear pin:

1. DISCONNECT LATHE FROM POWER!

2. Rotate the shroud washer on the leadscrew shown in **Figure 131**, so that the cutout lines up with the shear pin head.

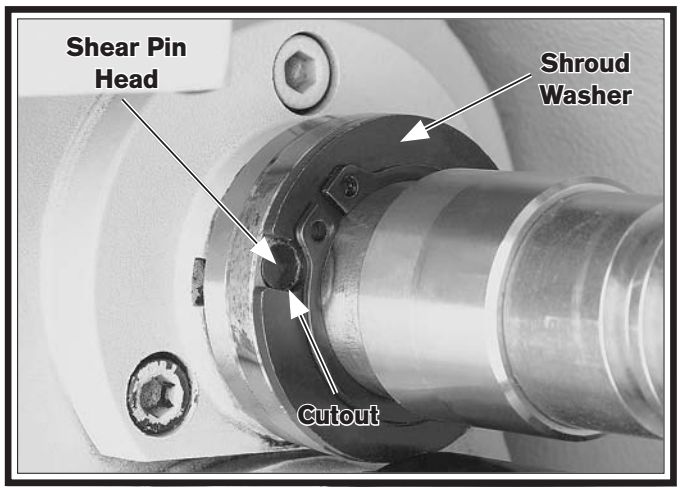


Figure 131. Shroud washer and shear pin alignment.

3. Put on safety glasses.

4. Move the retaining ring shown in **Figure 132** away from the shroud washer.

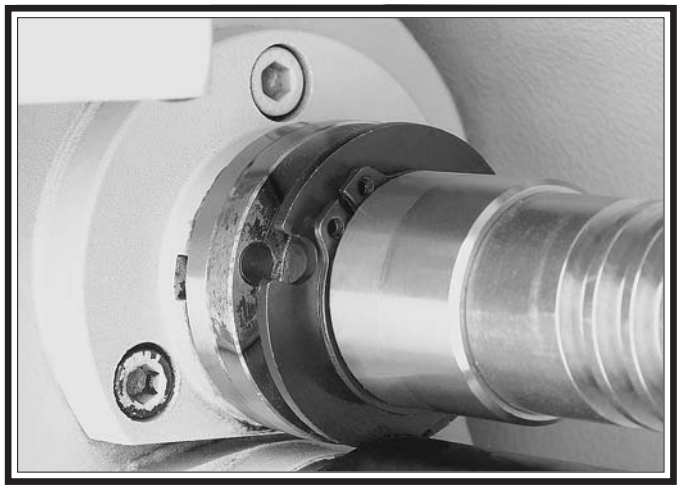


Figure 132. Shear pin access.

5. To make enough room to remove the shear pin, move the shroud washer away from the shear pin and against the retaining ring, as shown in **Figure 132**.

6. Use the magnet to remove the shear pin head, then rotate the lathe spindle to line up the inner and outer bores, as shown in **Figure 133**. Next, use the magnet to remove the other half of the broken shear pin when it becomes visible.

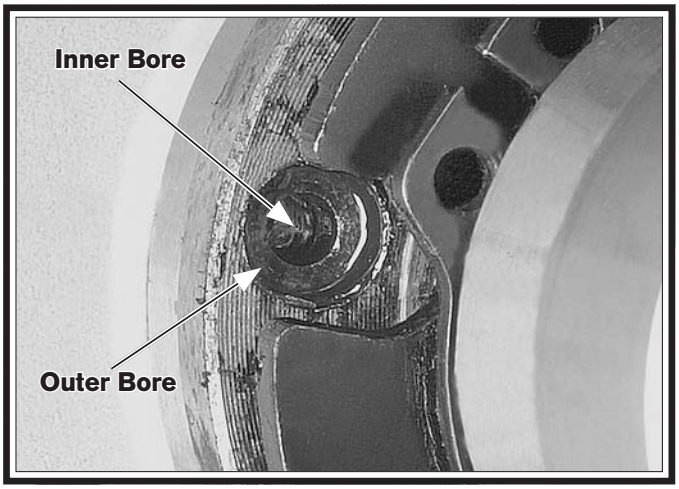


Figure 133. Shear pin bores aligned.

7. Insert the blow gun tip into the shear pin hole, blow out the hole with compressed air, then put a drop of oil in the hole.

8. Insert the new shear pin into the bore, as shown in **Figure 134**.

Note: If the pin does not freely slide into the bore, DO NOT use a hammer on the pin or you may permanently damage the shear mechanism and bore, which would make it nearly impossible to remove and install a new shear pin later.

Instead, take the time to carefully line up the two bores. You may need to file a slight chamfer on the end of the pin to make it easier to insert.

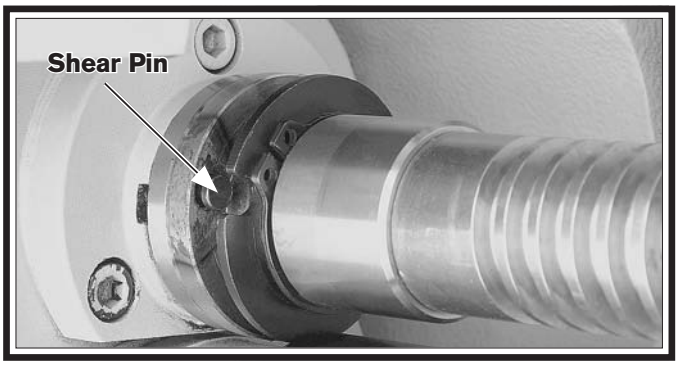


Figure 134. New shear pin installed in bore.

9. With the pin completely seated in the bore and the head flush with the leadscrew shoulder, slide the shroud washer against the shoulder, then rotate the washer 180° to completely cover the head of the shear pin, as shown in **Figure 135**.

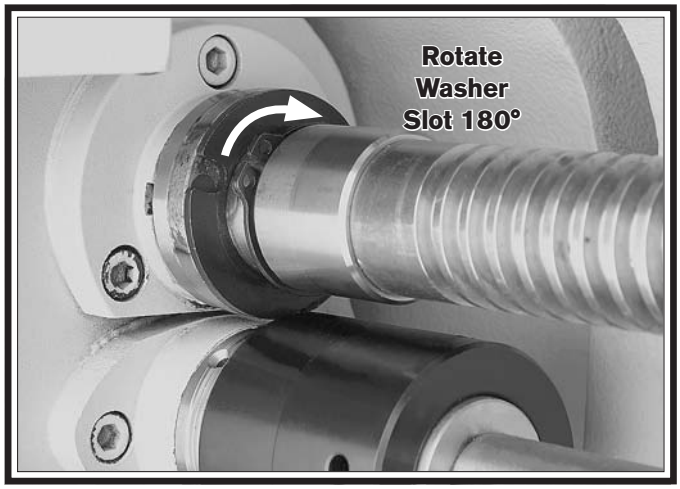


Figure 135. Shroud washer positioning.

10. Return the retaining ring against the shroud washer and position the retaining ring ears over the shear pin head, as shown in **Figure 136**. This will prevent the shear pin from falling out if the shroud washer should rotate during operation.

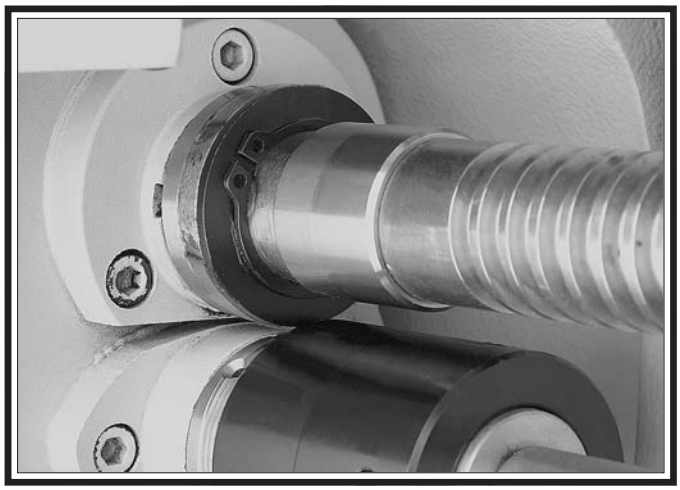


Figure 136. Retaining ring positioned with ears in front of pin access groove.

Gap Insert Removal & Installation

The gap insert directly under the spindle (see **Figure 137**) can be removed to create additional space for turning large diameter parts.

The gap insert was installed, then ground flush with the bed at the factory to ensure a precision fit and alignment. Therefore, if the gap insert is removed, it may be difficult to re-install with the same degree of accuracy.

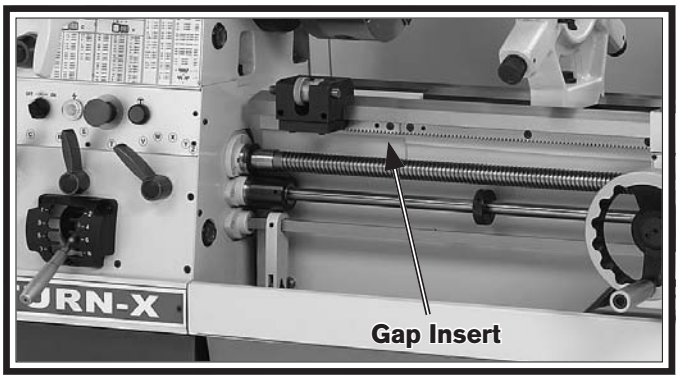


Figure 137. Gap insert.

Tools Needed:	**Qty**
Hex Wrench 6mm	1
Hex Wrench 8mm	1
Wrench 17mm	1
Dead Blow Hammer	1

Gap Removal

1. Remove the four gap-bed cap screws, shown in **Figure 138**.

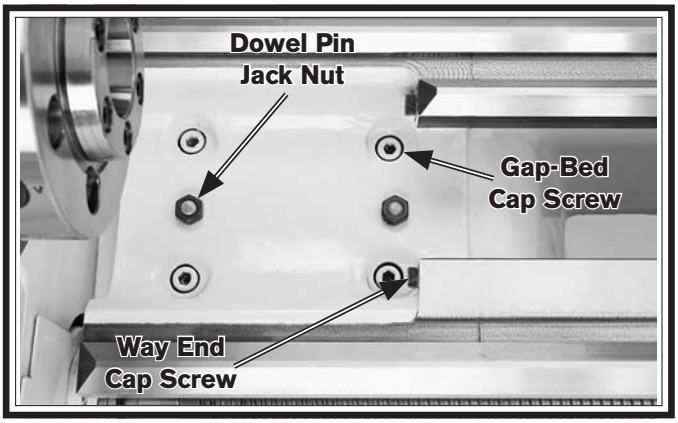


Figure 138. Fasteners holding gap in place.

2. Remove the two way-end cap screws.

3. Tighten the two dowel-pin jack nuts until the pins are pulled free from the gap insert.

4. Tap the outside of the gap insert with a dead blow hammer to loosen it, then remove it.

Gap Installation

1. Use mineral spirits and a clean lint-free rag to clean the mating surfaces of the gap, bed, and ways. If necessary, stone the mating surfaces to remove scratches, dings, or burrs.

2. Wipe a thin layer of light machine oil on the mating surfaces.

3. Place the gap insert into the gap and use a dead-blow hammer to align the insert with the lathe bed.

4. Back off the dowel pin jack nuts, and lightly tap the dowel pins back into their respective holes until they are seated. This process will further help align the gap insert and bed mating surfaces.

5. Install all fasteners and lightly snug them in place.

6. Mount a dial indicator with a magnetic base to the top of the saddle to indicate alignment.

7. First test the peak of the two prisms of the gap insert that the saddle rides on, then test the flanks of the prisms.

8. Tighten the gap bed cap screws in an alternating manner and tap the side of the gap insert into alignment.

9. Inspect the gap alignment 24 hours later to make sure the gap is still aligned. If necessary, loosen the gap bed cap screws and repeat **Steps 7–8** until the insert is properly aligned.

If you need replacement parts, or if you are unsure how to do any of the solutions given here, feel free to call us at (360) 734-1540.

Symptom	Possible Cause	Possible Solution
Machine does not start or a circuit breaker trips.	**1.** STOP button is engaged or at fault.	**1.** Rotate button clockwise until it pops out to reset it for operation; replace if not working properly.
	2. Spindle switch(es) are at fault.	**2.** Replace bad switch(es).
	3. Power supply is switched **OFF** at master power switch or breaker.	**3.** Make sure master power switch and circuit breaker are turned **ON**.
	4. Wall fuse/circuit breaker is blown/tripped; short in electrical system; start-up load too high for circuit.	**4.** Verify circuit is rated for machine amp load; troubleshoot and repair cause of overload; replace weak breaker; find/repair electrical short.
	5. Fuse has blown in machine electrical box.	**5.** Replace fuse; determine if overload is due to heavy operation; ensure power source has high enough voltage and power cord is correctly sized.
	6. One or more safety switches or brake switch are engaged.	**6.** Verify electrical box door, chuck guard, spindle, and brake switches are not engaged.
	7. Thermal overload relay has tripped.	**7.** Turn the thermal relay cut-out dial to increase working amps and push the reset pin. Replace if tripped multiple times (weak relay).
	8. Motor connection wired incorrectly.	**8.** Correct motor wiring connections.
	9. Safety/brake switch(es) at fault.	**9.** Test all switches and replace as necessary.
	10. Contactor not getting energized/has burned contacts.	**10.** Test for power on all legs and contactor operation. Replace unit if faulty.
	11. Wiring is open/has high resistance.	**11.** Check for broken wires or disconnected/corroded connections, and repair/replace as necessary.
	12. Frequency drive settings incorrect.	**12.** Contact Tech Support.
	13. Motor is at fault.	**13.** Test/repair/replace.
Loud, repetitious noise coming from lathe at or near the motor.	**1.** Pulley set screws or keys are missing or loose.	**1.** Inspect keys and set screws. Replace or tighten if necessary.
	2. Motor fan is hitting the cover.	**2.** Tighten fan, shim cover, or replace items.
Motor overheats.	**1.** Motor overloaded.	**1.** Reduce load on motor.
Motor is loud when cutting, or bogs down under load.	**1.** Excessive depth of cut or feed rate.	**1.** Decrease depth of cut or feed rate.
	2. Spindle speed or feed rate wrong for cutting operation.	**2.** Refer to the feeds and speeds charts in **Machinery's Handbook** or a speeds and feeds calculator on the internet.
	3. Cutting tool is dull.	**3.** Sharpen or replace the cutting tool.

Symptom	Possible Cause	Possible Solution
Entire machine vibrates upon startup and while running.	**1.** Workpiece is unbalanced.	**1.** Re-install workpiece as centered with the spindle bore as possible.
	2. Loose or damaged V-belt(s).	**2.** Re-tension/replace the V-belt(s) as necessary (see **Page 77**).
	3. V-belt pulleys are not properly aligned.	**3.** Align the V-belt pulleys.
	4. Worn or broken gear present.	**4.** Inspect gears and replace if necessary.
	5. Chuck or faceplate is unbalanced.	**5.** Re-balance chuck or faceplate; contact a local machine shop for help.
	6. Gears not aligned in headstock or no backlash.	**6.** Adjust gears and establish backlash.
	7. Broken gear or bad bearing.	**7.** Replace broken gear or bearing.
	8. Workpiece is hitting stationary object.	**8.** Stop lathe immediately and correct interference problem.
	9. Spindle bearings at fault.	**9.** Reset spindle bearing preload or replace worn spindle bearings.
Bad surface finish.	**1.** Wrong spindle speed or feed rate.	**1.** Adjust for appropriate spindle speed and feed rate.
	2. Dull tooling or poor tool selection.	**2.** Sharpen tooling or select a better tool for the intended operation.
	3. Tool height not at centerline.	**3.** Adjust tool height to centerline (see **Page 46**).
	4. Too much play in gibs.	**4.** Tighten gibs (see **Page 75**).
Tapered tool difficult to remove from tailstock quill.	**1.** Quill is not retracted all the way back into the tailstock.	**1.** Turn the quill handwheel until it forces the tapered tool out of quill.
	2. Contaminants not removed from taper before inserting into quill.	**2.** Clean the taper and bore and re-install tapered tool.
Cross slide, compound, or carriage feed has sloppy operation.	**1.** Gibs are out of adjustment.	**1.** Adjust gib screw(s) (see **Page 75**).
	2. Handwheel is loose or backlash is high.	**2.** Tighten handwheel fasteners, adjust handwheel backlash to a minimum (see **Page 74**).
	3. Leadscrew mechanism worn or out of adjustment.	**3.** Adjust leadscrew to remove end play (see **Page 75**).
Cross slide, compound, or carriage feed handwheel is hard to move.	**1.** Dovetail slides loaded with shavings, dust, or grime.	**1.** Remove gibs, clean ways/dovetails, lubricate, and re-adjust gibs.
	2. Gib screws are too tight.	**2.** Loosen gib screw(s) slightly, and lubricate bedways (see **Page 75**).
	3. Backlash setting too tight (cross slide only).	**3.** Slightly loosen backlash setting (see **Page 75**).
	4. Bedways are dry.	**4.** Lubricate bedways and handles.
Cutting tool or machine components vibrate excessively during cutting.	**1.** Tool holder not tight enough.	**1.** Check for debris, clean, and retighten.
	2. Cutting tool sticks too far out of tool holder; lack of support.	**2.** Re-install cutting tool so no more than ⅓ of the total length is sticking out of tool holder.
	3. Gibs are out of adjustment.	**3.** Adjust gib screws at affected component (see **Page 75**)
	4. Dull cutting tool.	**4.** Replace or resharpen cutting tool.
	5. Incorrect spindle speed or feed rate.	**5.** Use the recommended spindle speed.

Symptom	Possible Cause	Possible Solution
Workpiece is tapered.	**1.** Headstock and tailstock are not properly aligned with each other.	**1.** Realign the tailstock to the headstock spindle bore centerline (see **Page 39**).
Chuck jaws will not move or do not move easily.	**1.** Chips lodged in the jaws or scroll plate.	**1.** Remove jaws, clean and lubricate scroll plate, then replace jaws.
Carriage will not feed, or is hard to move.	**1.** Gears are not all engaged. **2.** Loose screw on the feed handle. **3.** Carriage lock is tightened down. **4.** Chips have loaded up on bedways. **5.** Bedways are dry and in need of lubrication. **6.** Micrometer stop is interfering. **7.** Gibs are too tight. **8.** Gears or shear pin broken.	**1.** Adjust gear levers. **2.** Tighten. **3.** Check to make sure the carriage lock bolt is fully released. **4.** Frequently clean away chips that load up during turning operations. **5.** Lubricate bedways and handles. **6.** Check micrometer stop position, and adjust it as necessary (see **Page 47**). **7.** Loosen gib screw(s) slightly (see **Page 75**). **8.** Replace gears or shear pin (see **Page 80**).
Gear change levers will not shift into position.	**1.** Gears not aligned inside headstock.	**1.** Rotate spindle by hand with light pressure on the lever until gear falls into place.

Electrical Safety Instructions

These pages are accurate at the time of printing. In the constant effort to improve, however, we may make changes to the electrical systems of future machines. Study this section carefully. If you see differences between your machine and what is shown in this section, call Technical Support at (360) 734-1540 for assistance BEFORE making any changes to the wiring on your machine.

Shock Hazard: It is extremely dangerous to perform electrical or wiring tasks while the machine is connected to the power source. Touching electrified parts will result in personal injury including but not limited to severe burns, electrocution, or death. For your own safety, disconnect machine from the power source before servicing electrical components or performing any wiring tasks!

Wire Connections: All connections must be tight to prevent wires from loosening during machine operation. Double-check all wires disconnected or connected during any wiring task to ensure tight connections.

Modifications: Using aftermarket parts or modifying the wiring beyond what is shown in the diagram may lead to unpredictable results, including serious injury or fire.

Motor Wiring: The motor wiring shown in these diagrams is current at the time of printing, but it may not match your machine. Always use the wiring diagram inside the motor junction box.

Circuit Requirements: Connecting the machine to an improperly sized circuit will greatly increase the risk of fire. To minimize this risk, only connect the machine to a power circuit that meets the minimum requirements given in this manual.

Capacitors/Inverters: Some capacitors and power inverters store an electrical charge for up to 10 minutes after being disconnected from the power source. To reduce the risk of being shocked, wait at least this long before working on capacitors.

Wire/Component Damage: Damaged wires or components increase the risk of serious personal injury, fire, or machine damage. If you notice that any wires or components are damaged while performing a wiring task, replace those wires or components before completing the task.

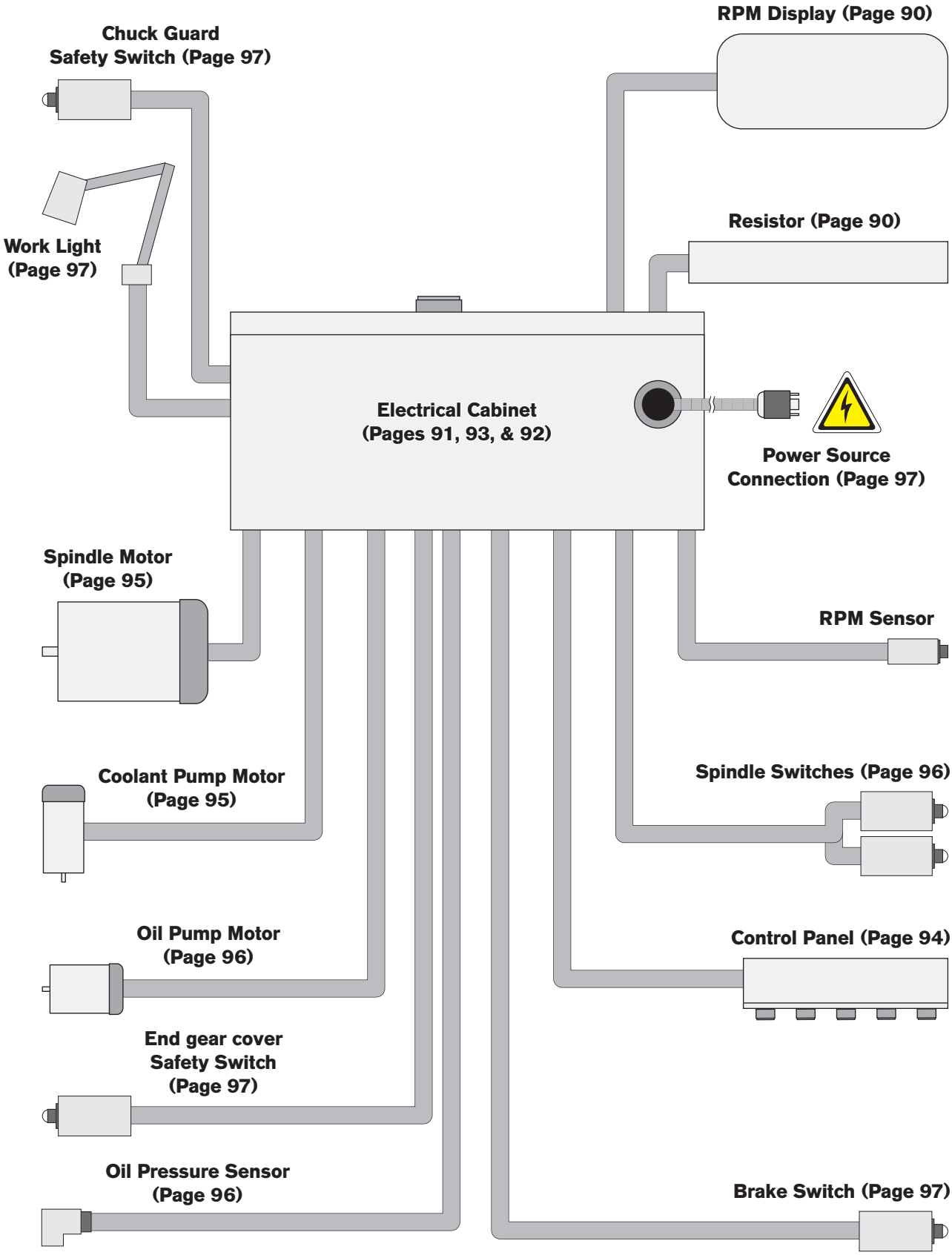
Experiencing Difficulties: If you are experiencing difficulties understanding the information included in this section, contact our Technical Support at (360) 734-1540.

WIRING DIAGRAM COLOR KEY

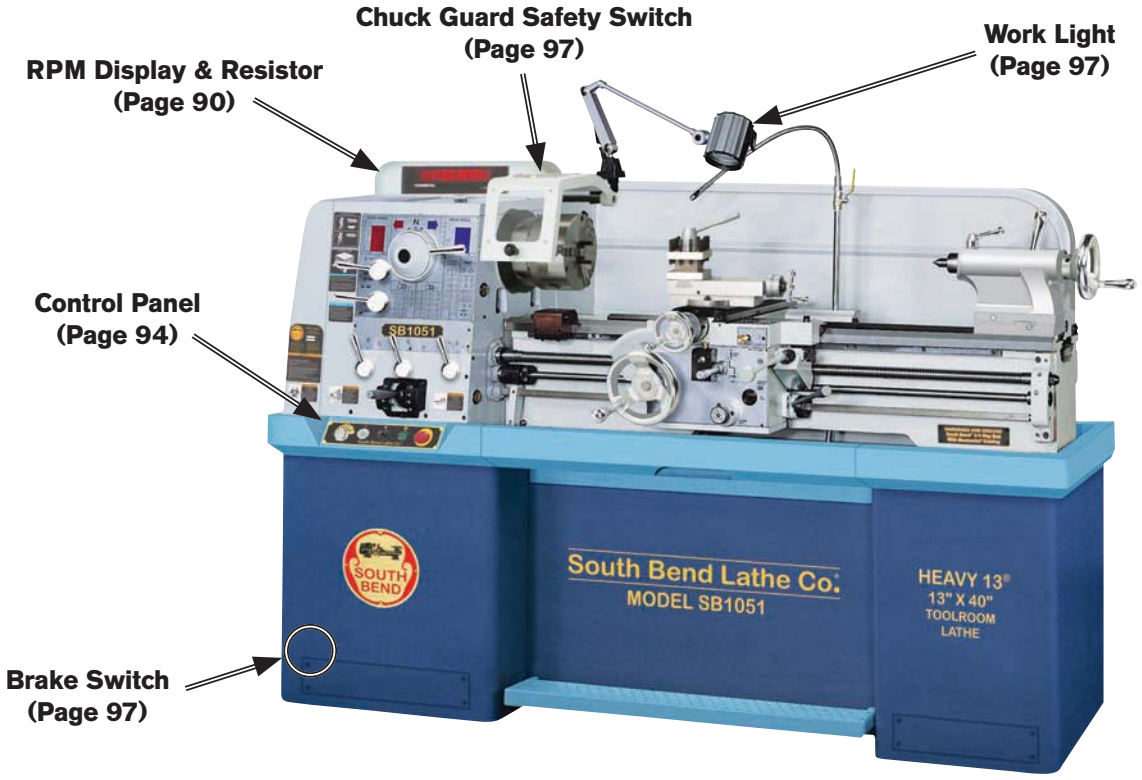
BLACK (Bk)	BLUE WHITE (Bw)	RED (Rd)	PINK (Pk)	WHITE (Wt)
BLUE (Bl)	GREEN (Gn)	LIGHT BLUE (Lb)	PURPLE (Pu)	YELLOW GREEN (Yg)
BROWN (Br)	GRAY (Gy)	ORANGE (Or)	TURQUOISE (Tu)	YELLOW (Yl)
	LIGHT GREEN (Lg)	BLACK/ PINK (Bp)	BLACK/ GREEN (Bg)	

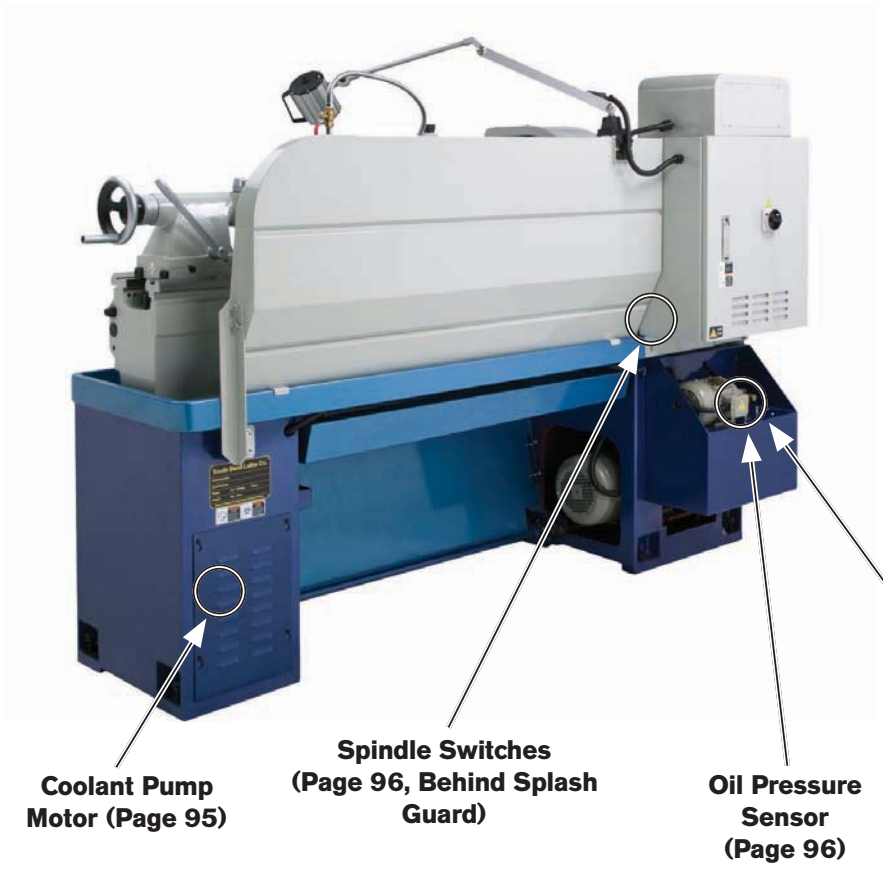
NOTICE: **The photos and diagrams included in this section are best viewed in color. You can see them in color at www.southbendlathe.com.**

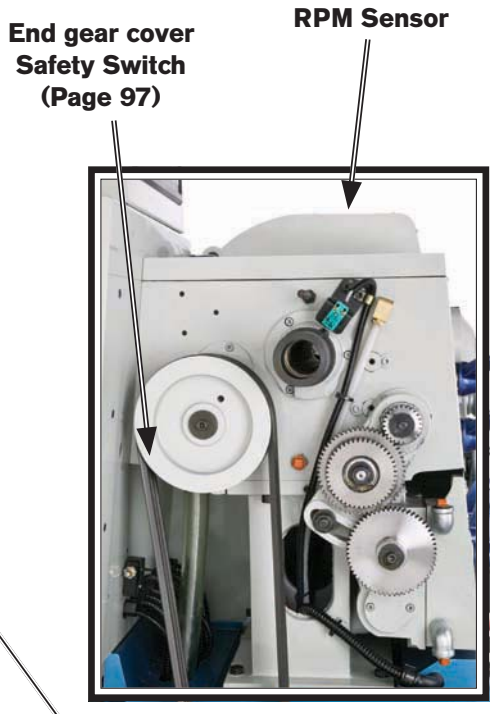
Machine Electrical Overview



Electrical Component Location Index







Electrical Cabinet Overview

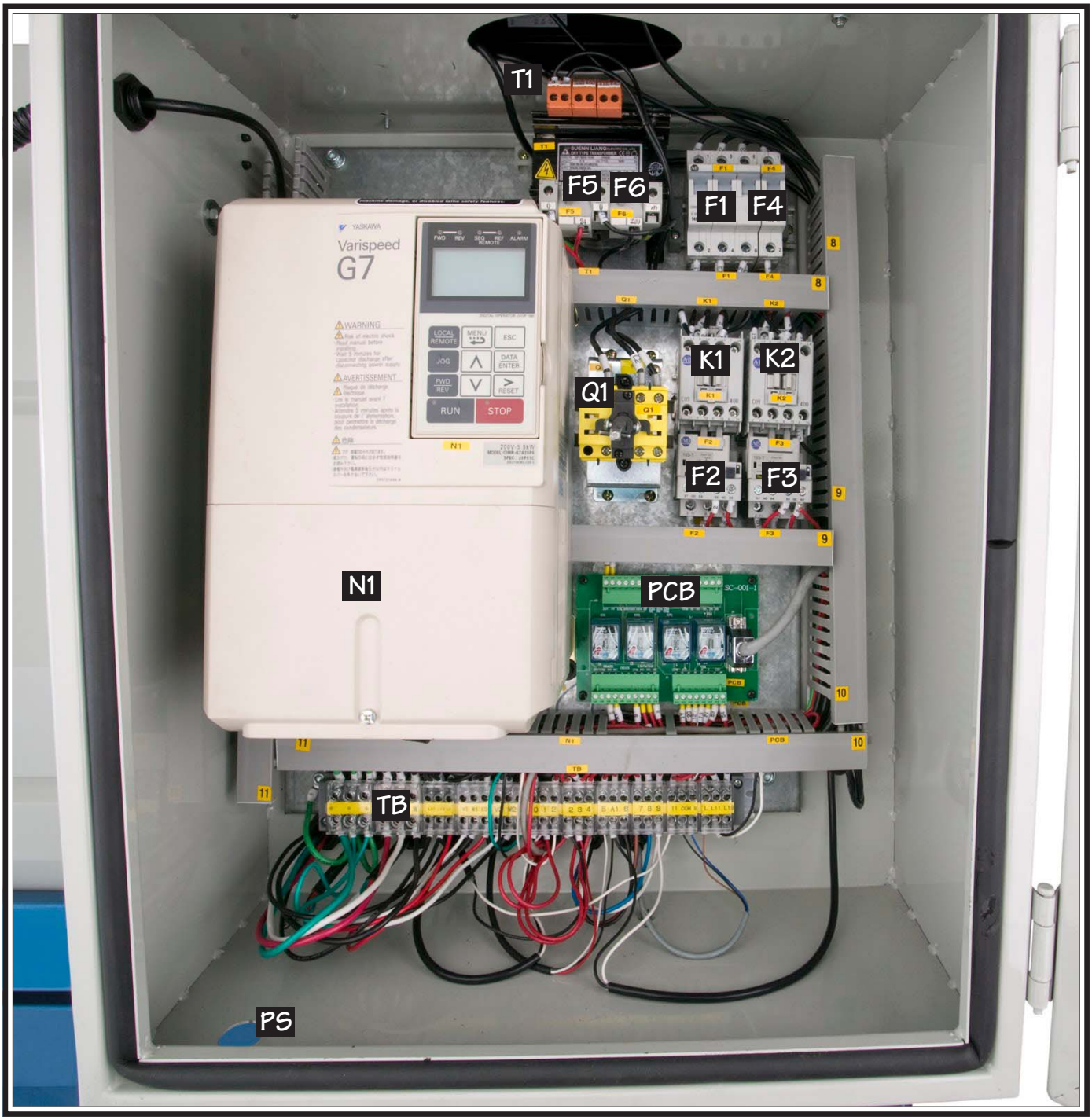


Figure 139. Electrical cabinet components and wiring.

- F1 Circuit Breaker 24V (**Page 91**)
- F2 Spindle Motor Overload Relay (**Page 91**)
- F3 Oil Pump Motor Overload Relay (**Page 91**)
- F4 Circuit Breaker 6A (**Page 91**)
- F5 Fuse 4A (**Page 91**)
- F6 Fuse 0.5A (**Page 91**)
- K1 Spindle Motor Contactor (**Page 91**)
- K2 Oil Pump Motor Contactor (**Page 91**)
- N1 Inverter (**Page 92**)
- PCB Circuit Board (**Page 93**)
- PS Power Source (**Page 97**)
- Q1 Master Power Switch (**Page 91**)
- T1 Transformer (**Page 91**)
- TB Terminal Board (**Page 92**)

RPM Display Cabinet Overview

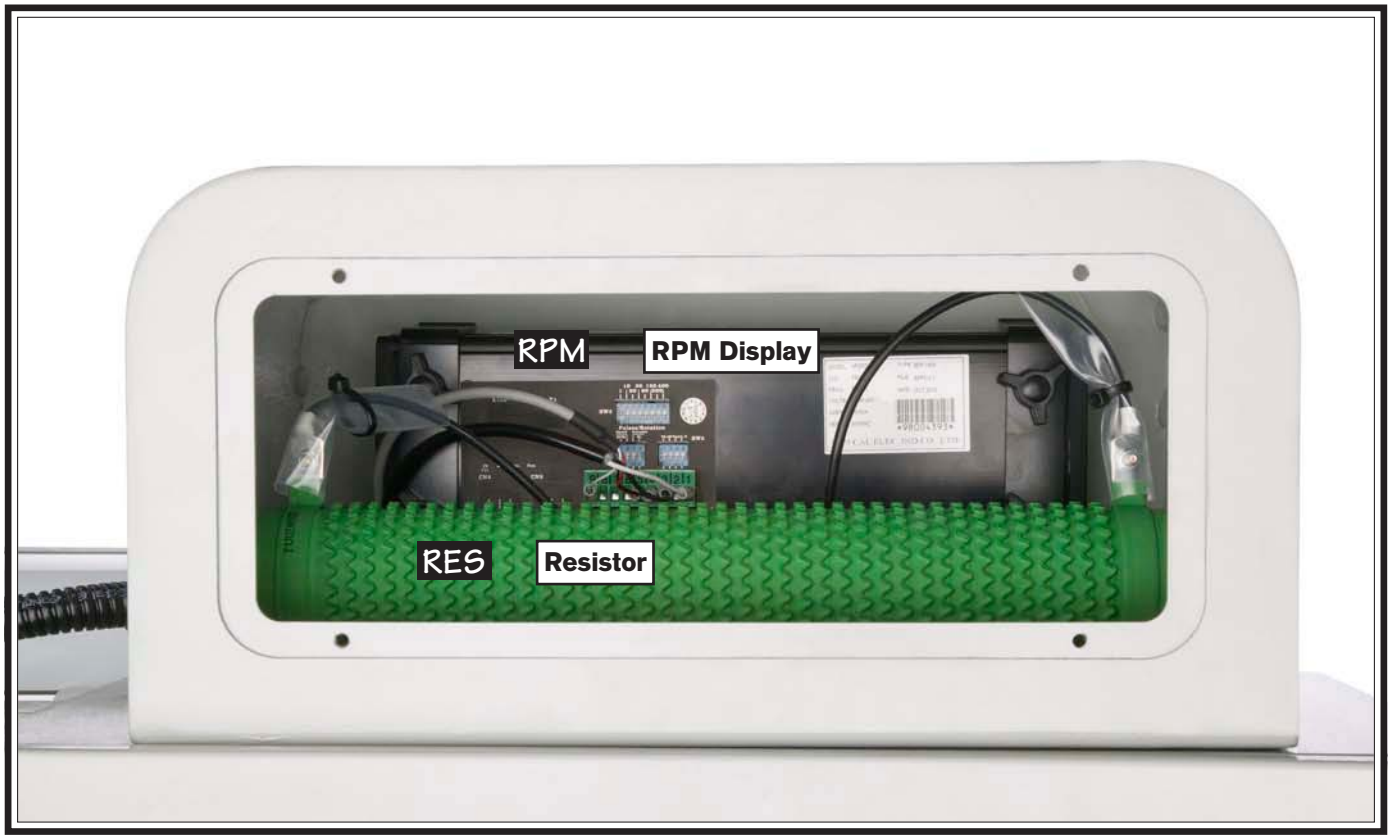
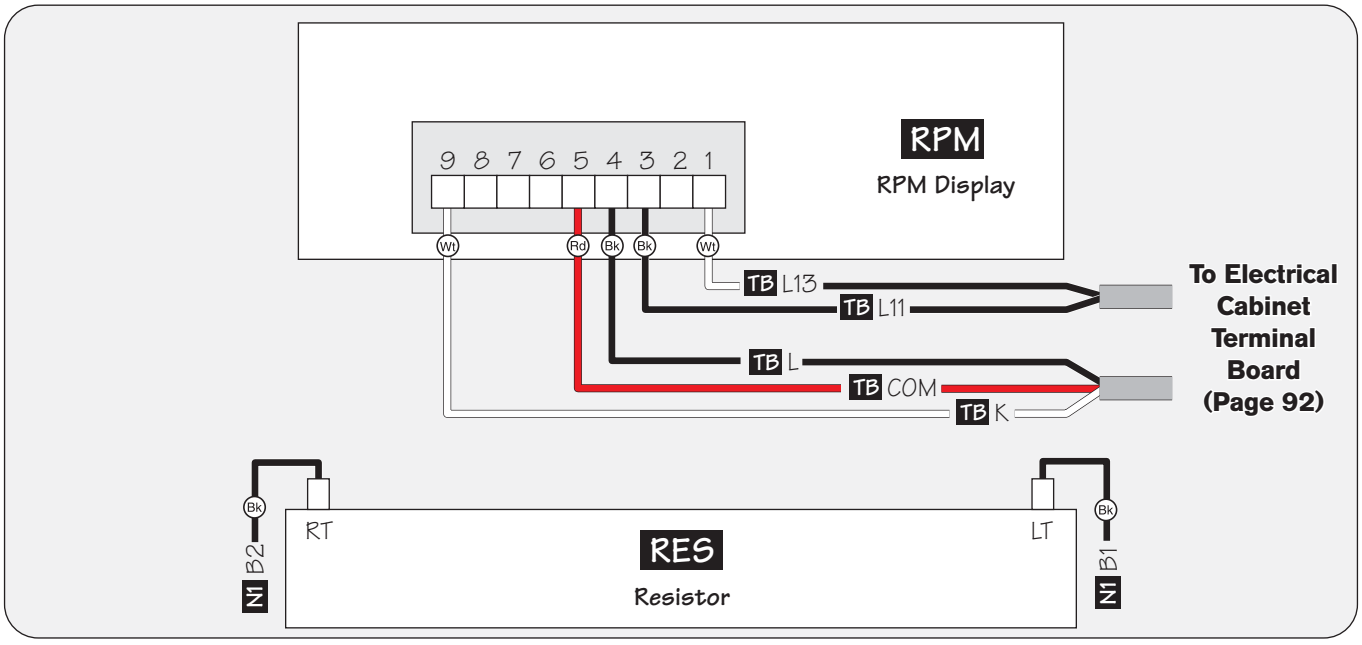
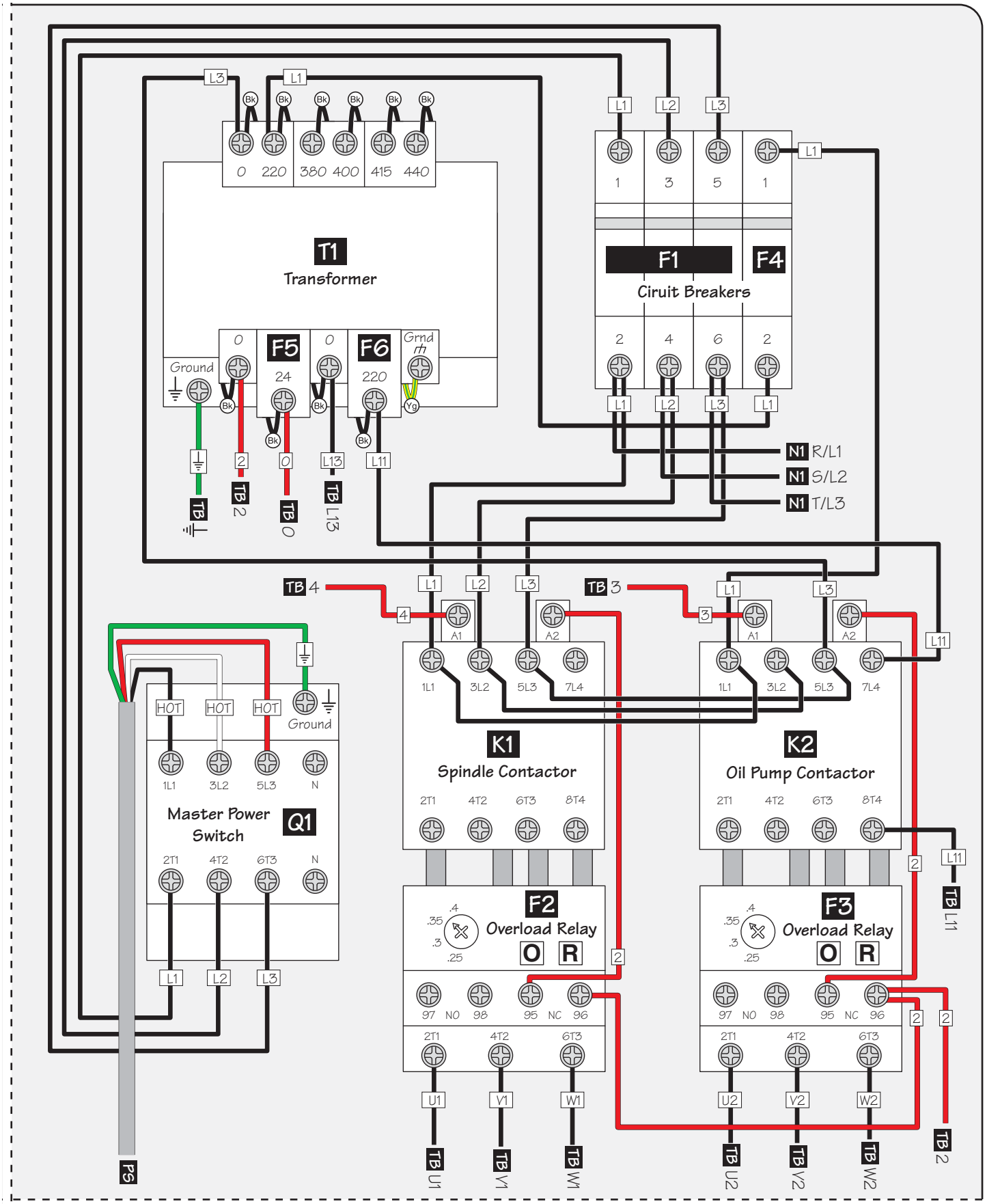


Figure 140. RPM cabinet components and wiring.

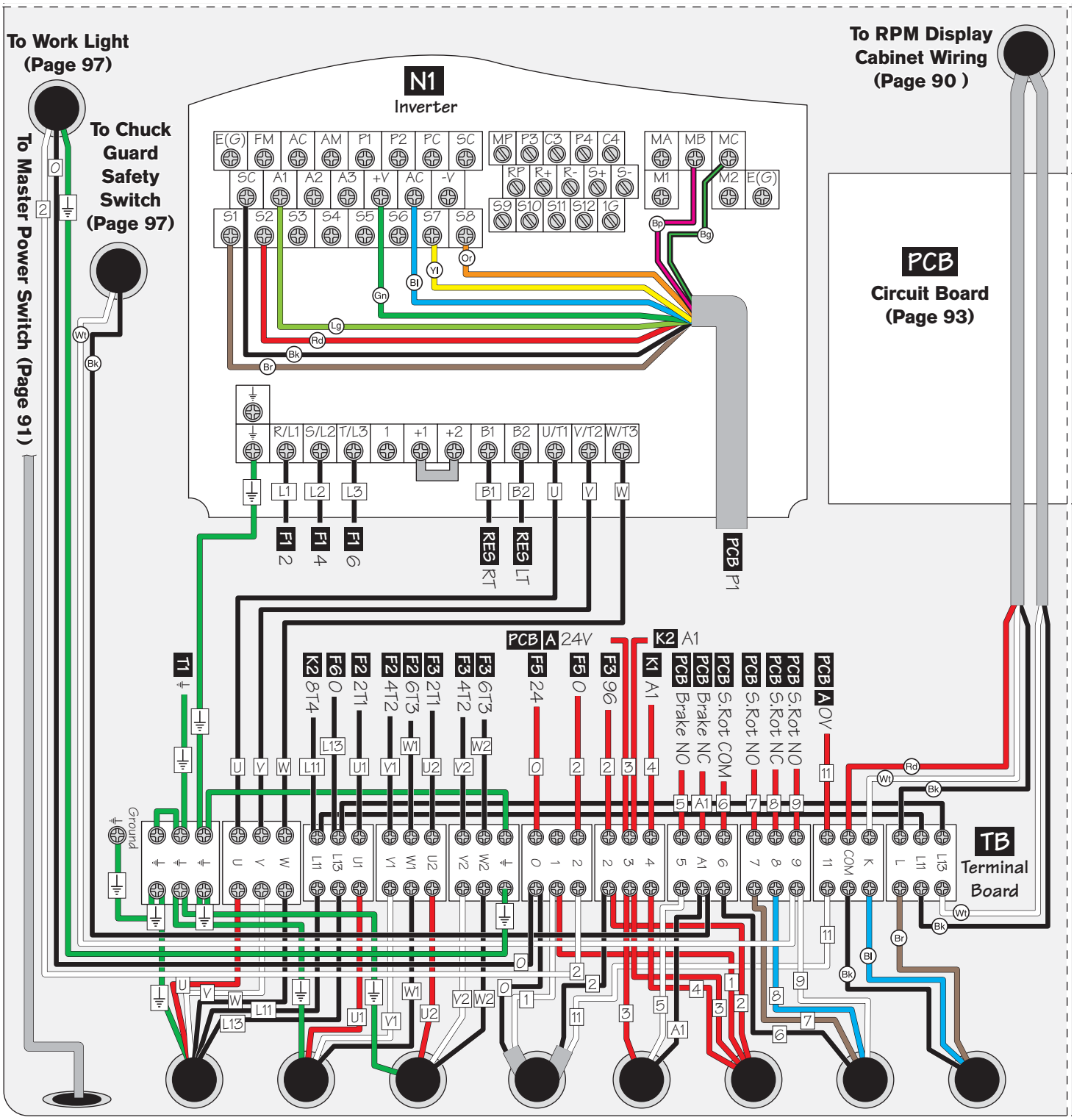
RPM Display Cabinet Wiring Diagram (RPM & RES)



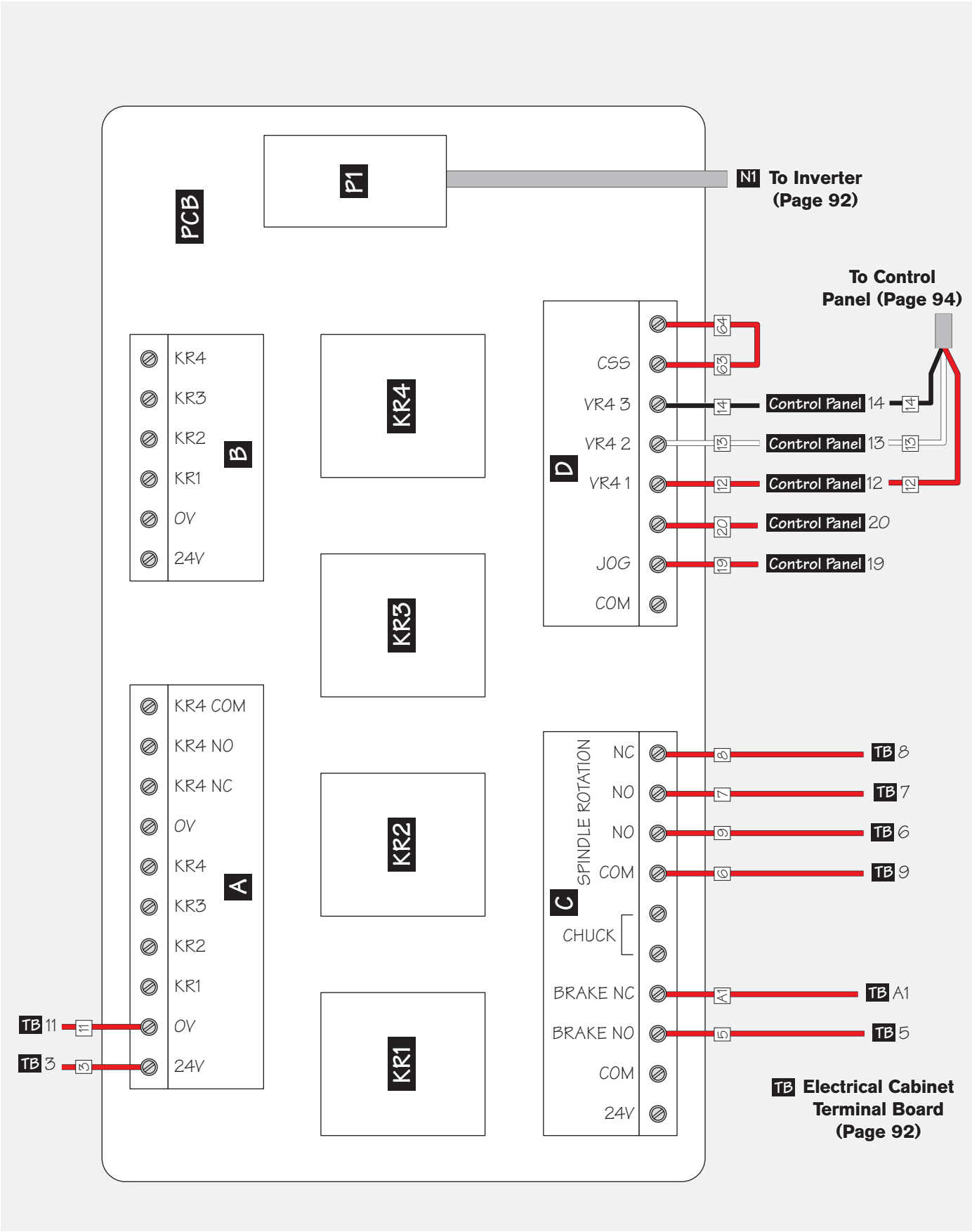
Upper Electrical Cabinet Wiring Diagram



Inverter (N1) & Terminal Board (TB) Wiring


To Work Light (Page 97)
To Chuck Guard Safety Switch (Page 97)
To Master Power Switch (Page 91)
To RPM Display Cabinet Wiring (Page 90)
N1
Inverter
PCB
Circuit Board (Page 93)
TB
Terminal Board
To Power Source (Page 97)
To Spindle Motor (Page 95)
To Coolant Pump Motor (Page 95)
To Oil Pump Motor (Page 96)
To Oil Pressure Switch (Page 96)
To End Cover Safety Switch (Page 97)
To Brake Switch (Page 97)
To Control Panel (Page 94)
To Spindle Switches (Page 96)
To RPM Sensor

Circuit Board (PCB) Wiring Diagram



Control Panel Overview

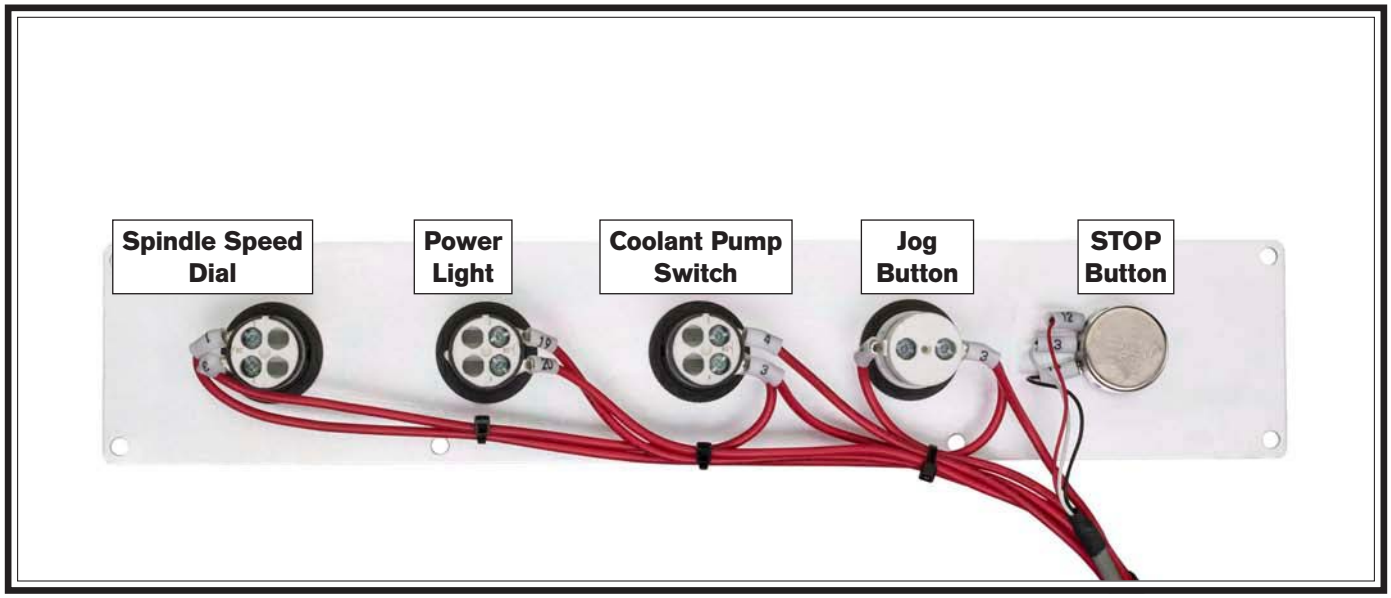
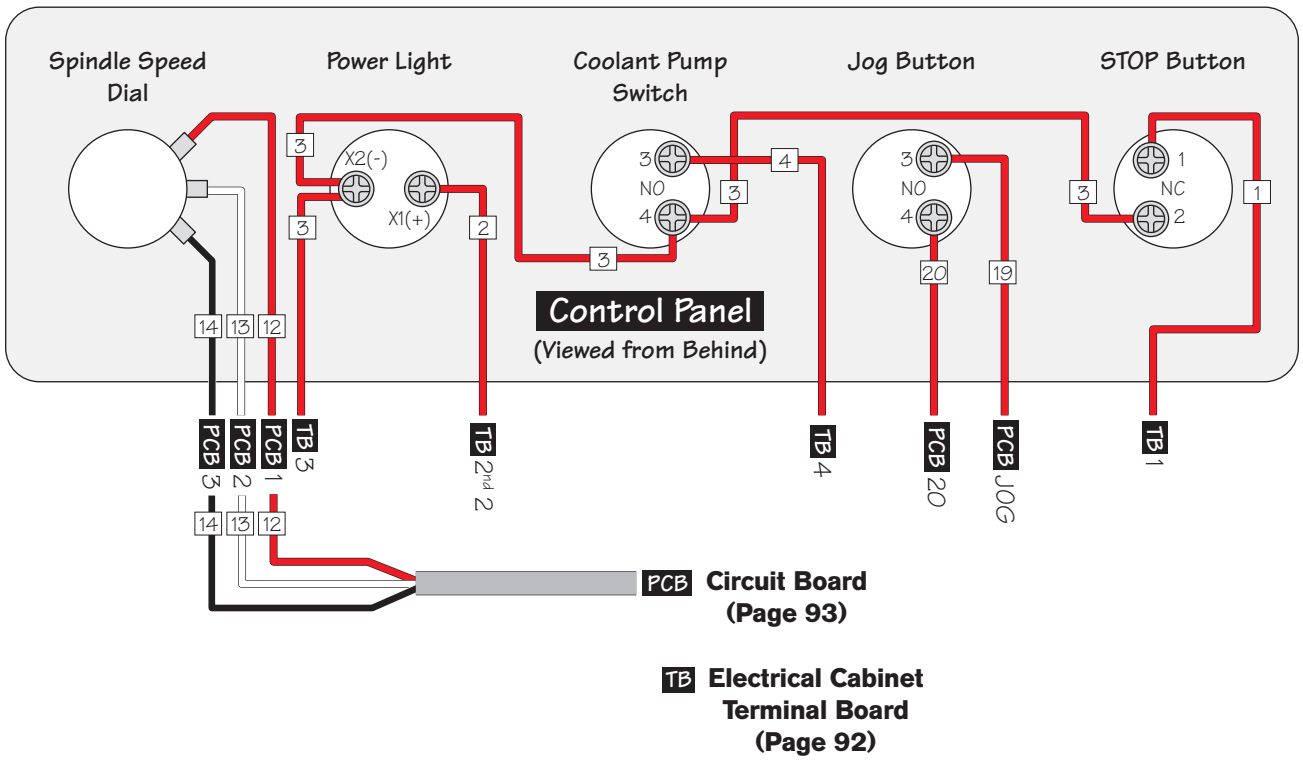
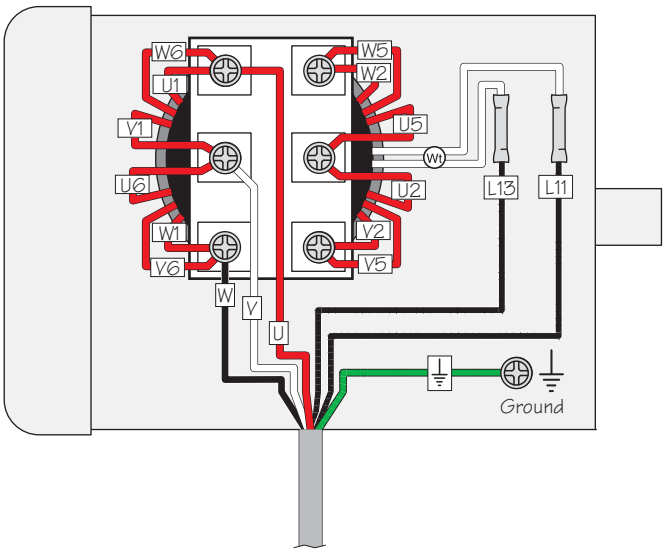


Figure 141. Control panel wiring (viewed from behind).

Control Panel Wiring Diagram



Spindle Motor Wiring



To Electrical Cabinet Terminal Board (Page 92)

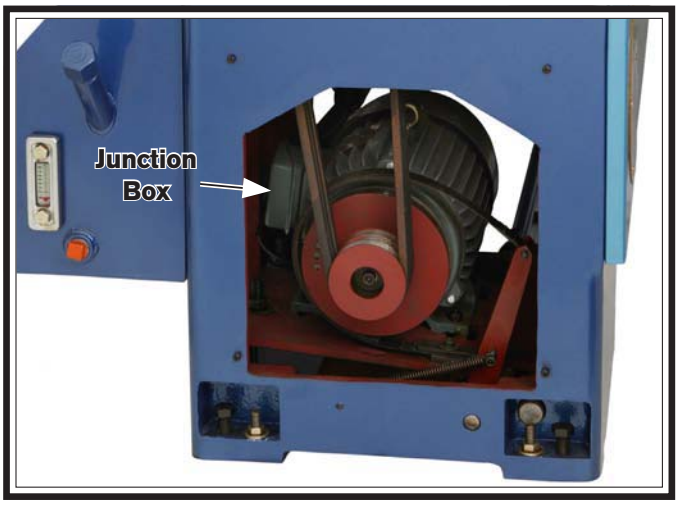
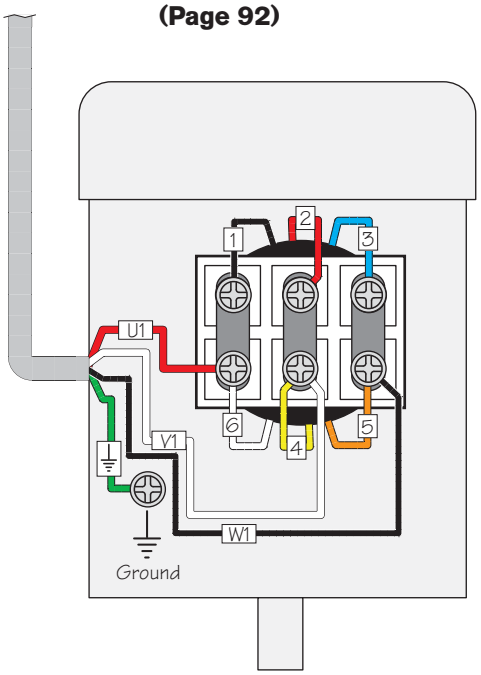


Figure 142. Spindle motor junction box.

Coolant Pump Motor Wiring

To Electrical Cabinet Terminal Board (Page 92)



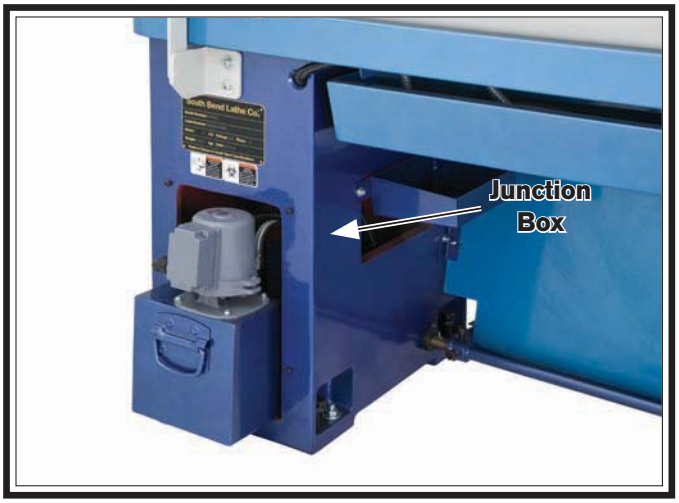


Figure 143. Coolant pump junction box.

Spindle Switch Wiring

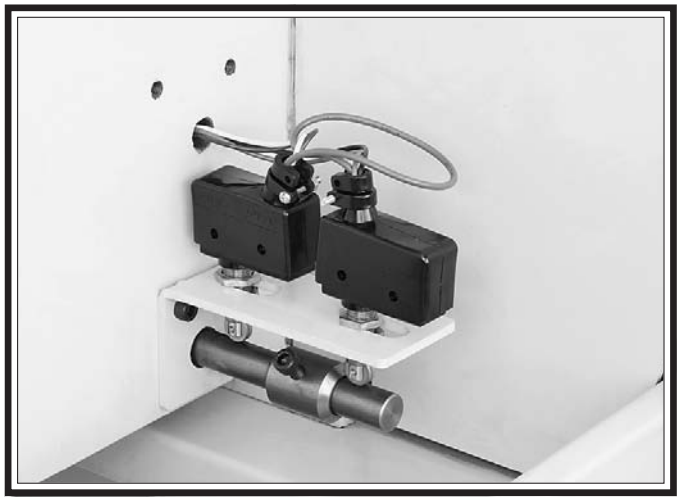
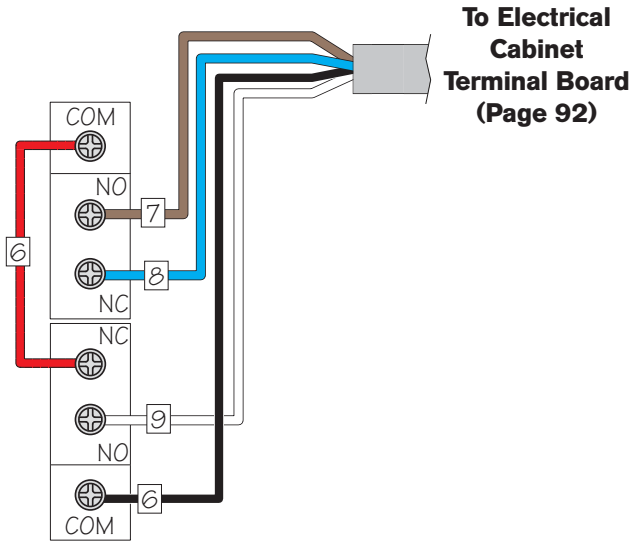
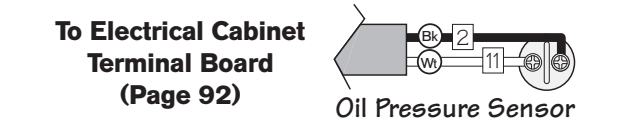


Figure 144. Spindle switch wiring.



Oil Pump Motor & Pressure Sensor Wiring



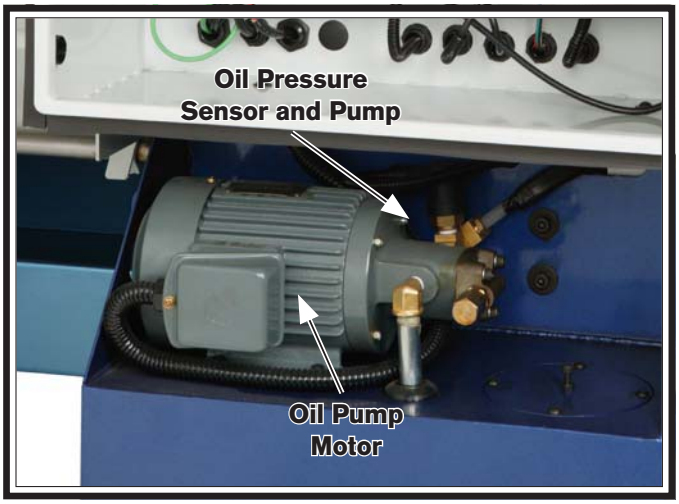
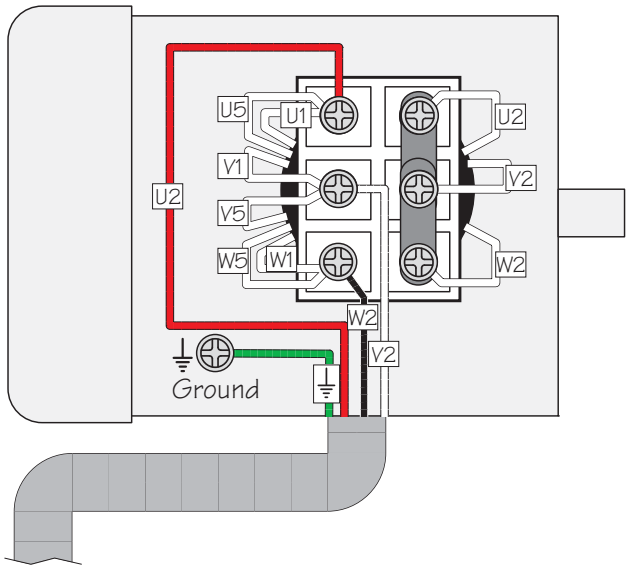


Figure 145. Oil pump motor & pressure sensor.



To Electrical Cabinet Terminal Board (Page 92)

Additional Component Wiring

Figure 146. End gear cover safety switch and RPM sensor.

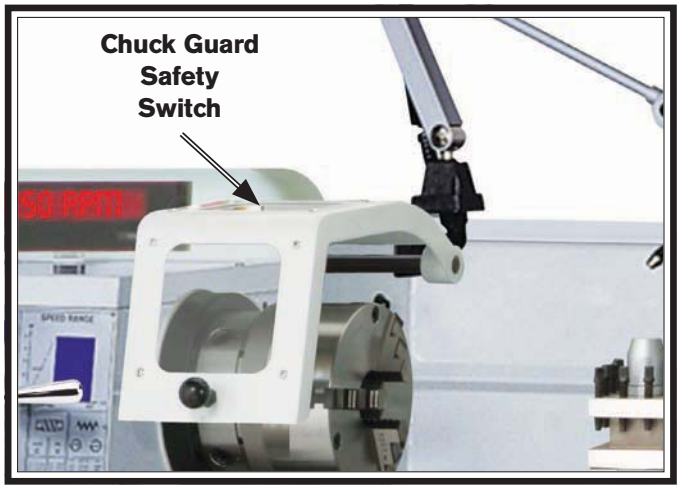
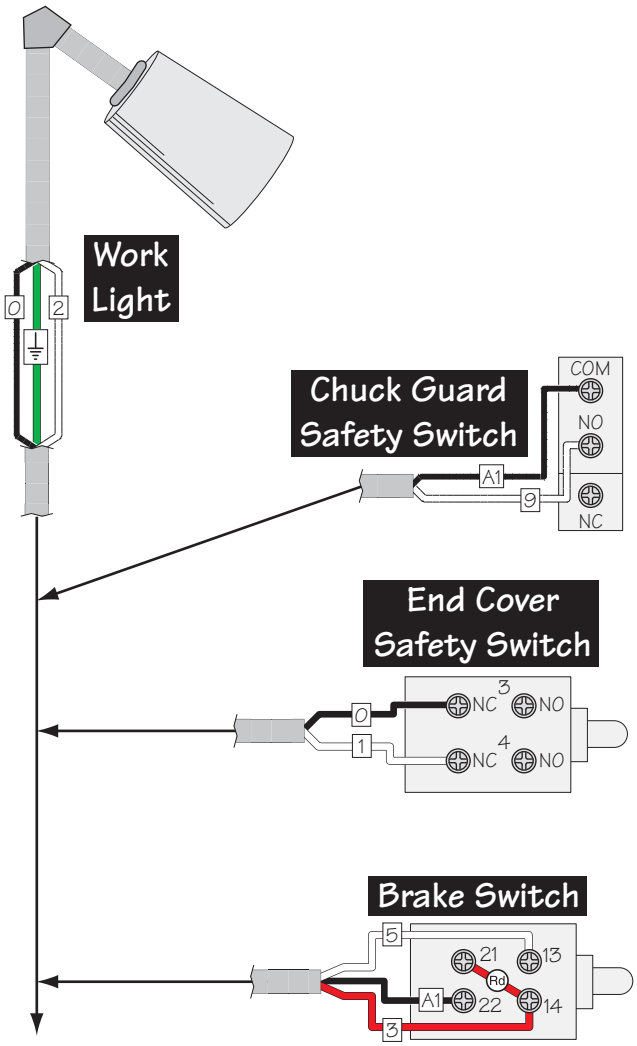
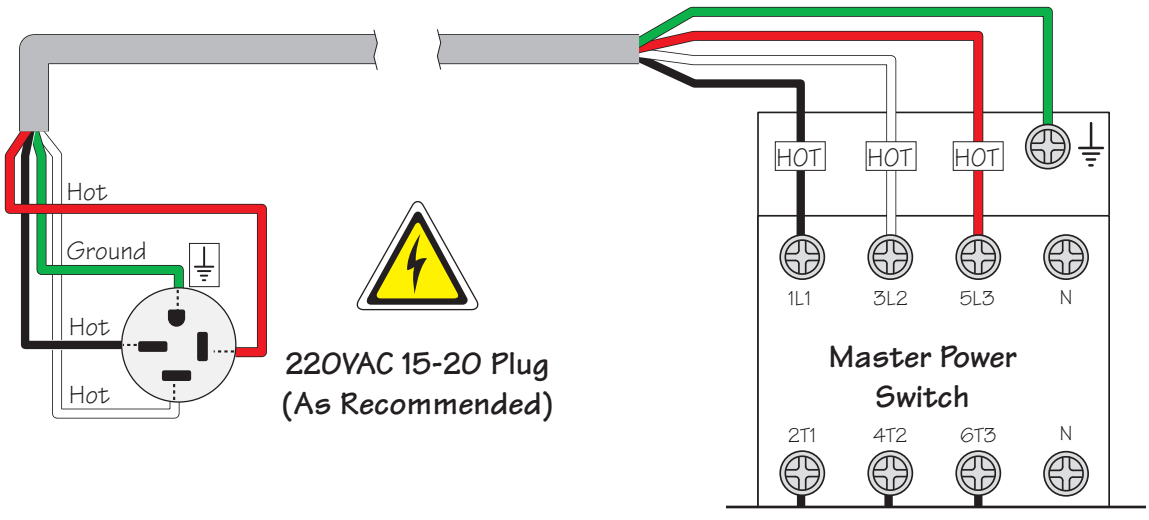


Figure 147. Chuck guard safety switch.

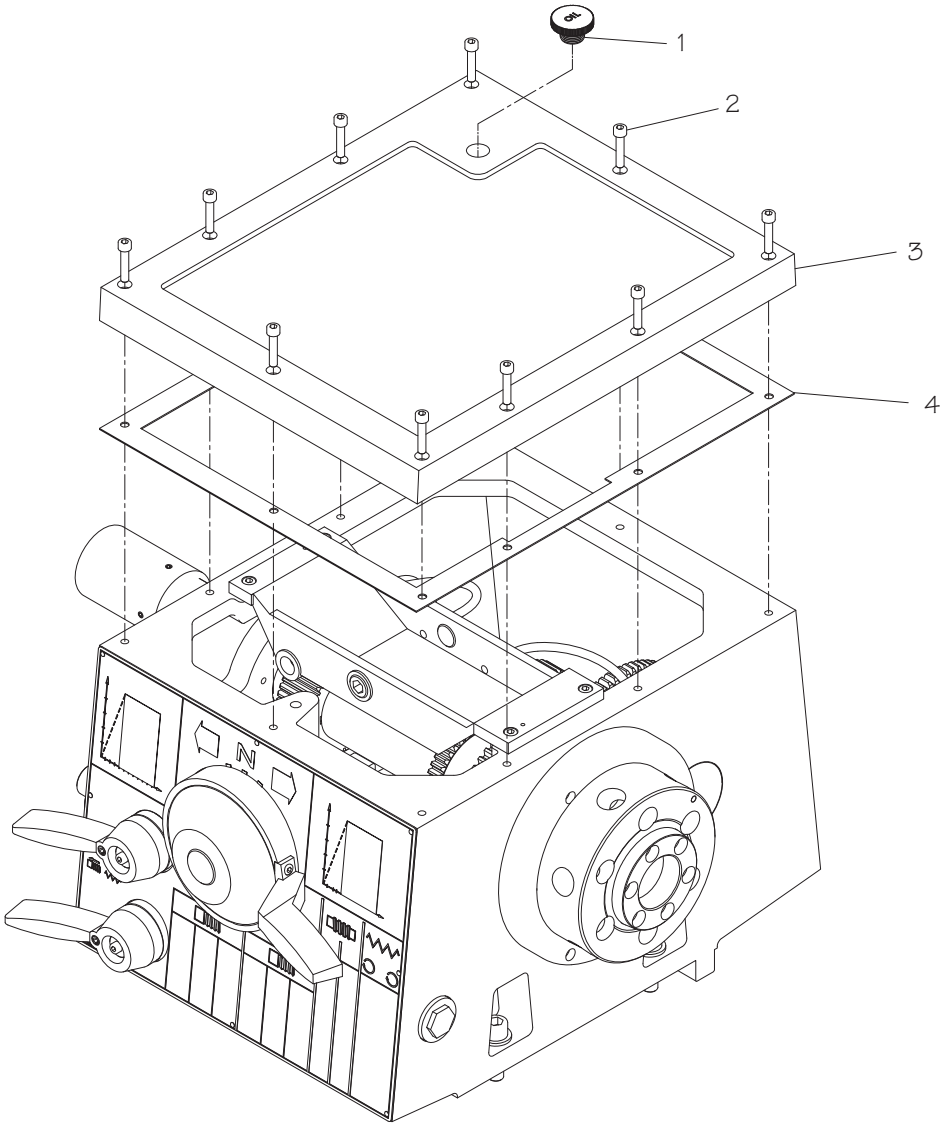


To Electrical Cabinet Terminal Board (Page 92)

Power Supply Connection (PS)



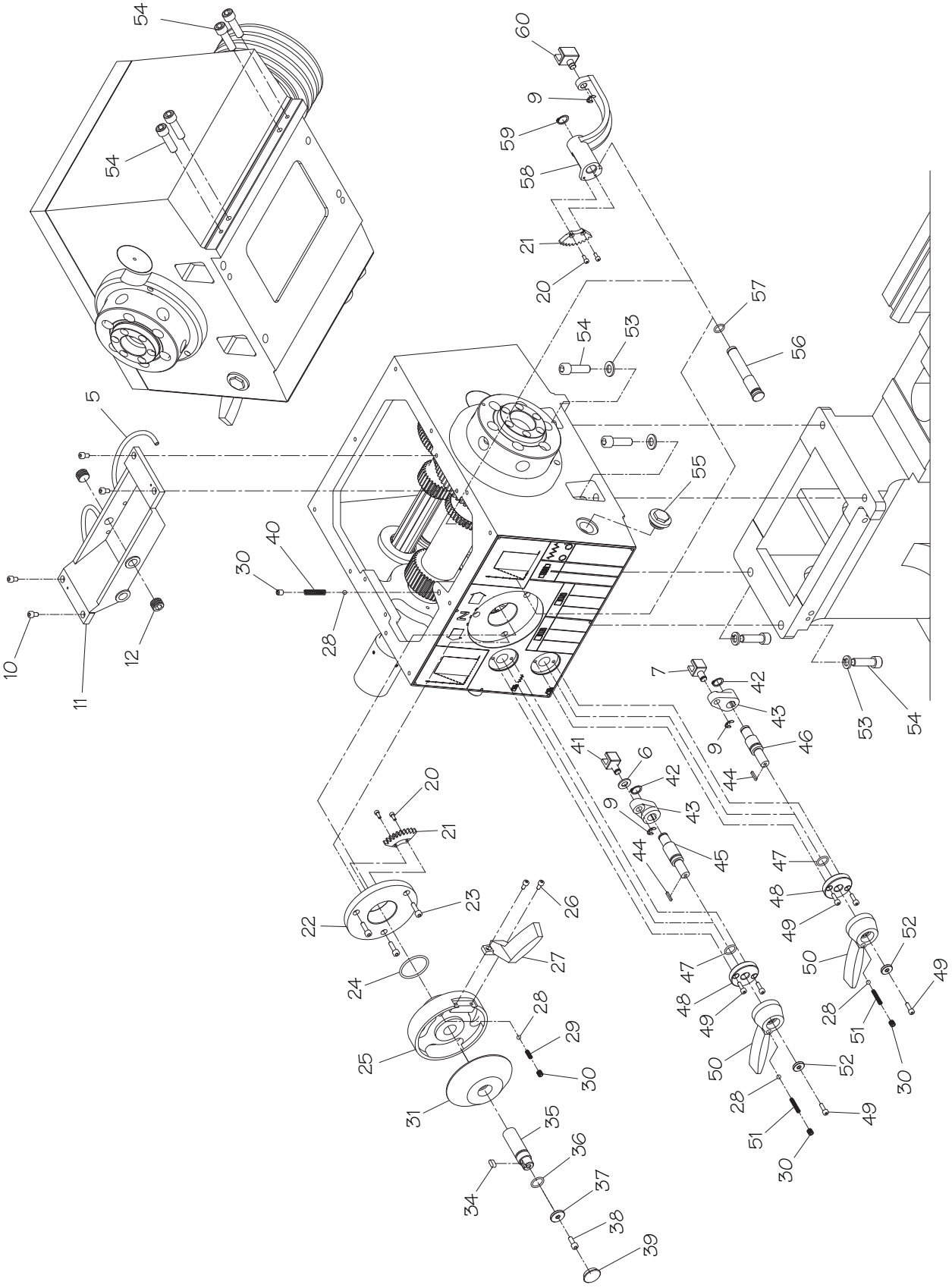
Headstock Cover



REF	PART #	DESCRIPTION
1	PSB10510001	OIL CAP
2	PCAP29M	CAP SCREW M6-1 X 40

REF	PART #	DESCRIPTION
3	PSB10510003	HEADSTOCK TOP COVER
4	PSB10510004	TOP COVER GASKET

Headstock Controls

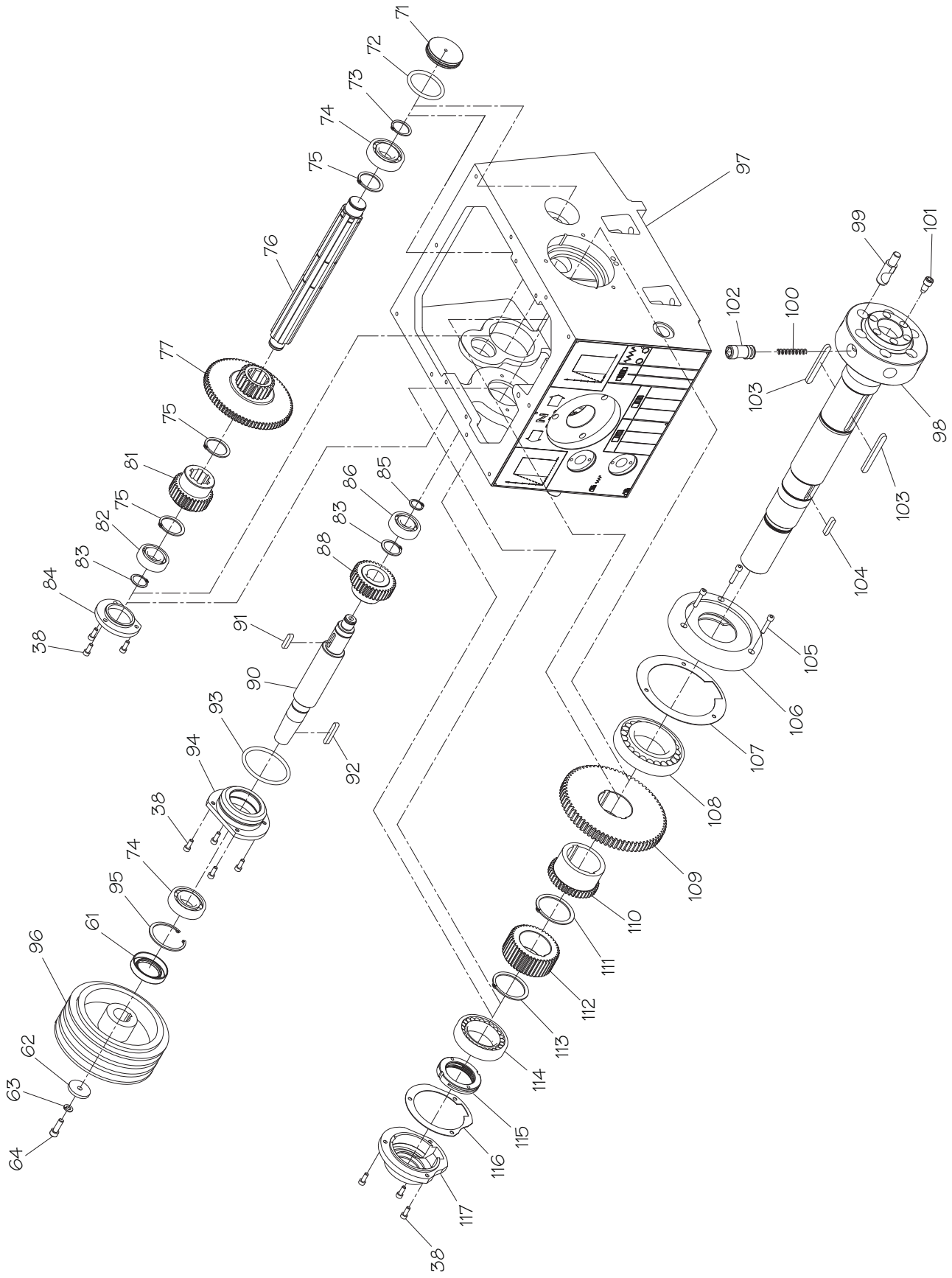


Headstock Controls Parts List

REF	PART #	DESCRIPTION
5	PSB10510005	OIL TUBE 6 X 270MM
6	PW04M	FLAT WASHER 10MM
7	PSB10510007	FEED DIRECTION SHIFT FORK
9	PEC015M	E-CLIP 8MM
10	PCAP04M	CAP SCREW M6-1 X 10
11	PSB10510011	OIL TRAY
12	PSB10510012	OIL PLUG 3/8"PT
20	PCAP17M	CAP SCREW M4-.7 X 10
21	PSB10510021	GEAR 40T
22	PSB10510022	SPEED RANGE SELECTOR BRACKET
23	PCAP02M	CAP SCREW M6-1 X 20
24	PORP044	O-RING 43.7 X 3.5 P44
25	PSB10510025	SPEED RANGE SELECTOR BASE
26	PCAP50M	CAP SCREW M5-.8 X 10
27	PSB10510027	SPEED RANGE SELECTOR LEVER
28	PSTB001	STEEL BALL 1/4"
29	PSB10510029	COMPRESSION SPRING
30	PSS20M	SET SCREW M8-1.25 X 8
31	PSB10510031	SPEED RANGE SELECTOR HUB
34	PK101M	KEY 6 X 6 X 14
35	PSB10510035	CONTROL HUB SHAFT
36	PORP018	O-RING 17.8 X 2.4 P18
37	PSB10510037	HUB FLAT WASHER 6MM

REF	PART #	DESCRIPTION
38	PCAP01M	CAP SCREW M6-1 X 16
39	PSB10510039	END PLUG
40	PSB10510040	COMPRESSION SPRING
41	PSB10510041	GEARBOX RANGE SHIFT FORK
42	PR05M	EXT RETAINING RING 15MM
43	PSB10510043	PIVOT ARM
44	PK155M	KEY 3 X 3 X 18
45	PSB10510045	FEED DIRECTION SHIFT SHAFT
46	PSB10510046	GEARBOX RANGE SHIFT SHAFT
47	PORP016	O-RING 15.8 X 2.4 P16
48	PSB10510048	SHIFT LEVER BRACKET
49	PCAP24M	CAP SCREW M5-.8 X 16
50	PSB10510050	SHIFT LEVER
51	PSB10510051	COMPRESSION SPRING
52	PSB10510052	LEVER FLAT WASHER 5MM
53	PLW05M	LOCK WASHER 12MM
54	PCAP92M	CAP SCREW M12-1.75 X 40
55	PSB10510055	OIL SIGHT GLASS 3/4"
56	PSB10510056	ALIGNMENT SHAFT
57	PORP014	O-RING 13.8 X 2.4 P14
58	PSB10510058	SHIFT ARM
59	PR06M	EXT RETAINING RING 16MM
60	PSB10510060	SPEED RANGE SHIFT FORK

Headstock Internal Gears

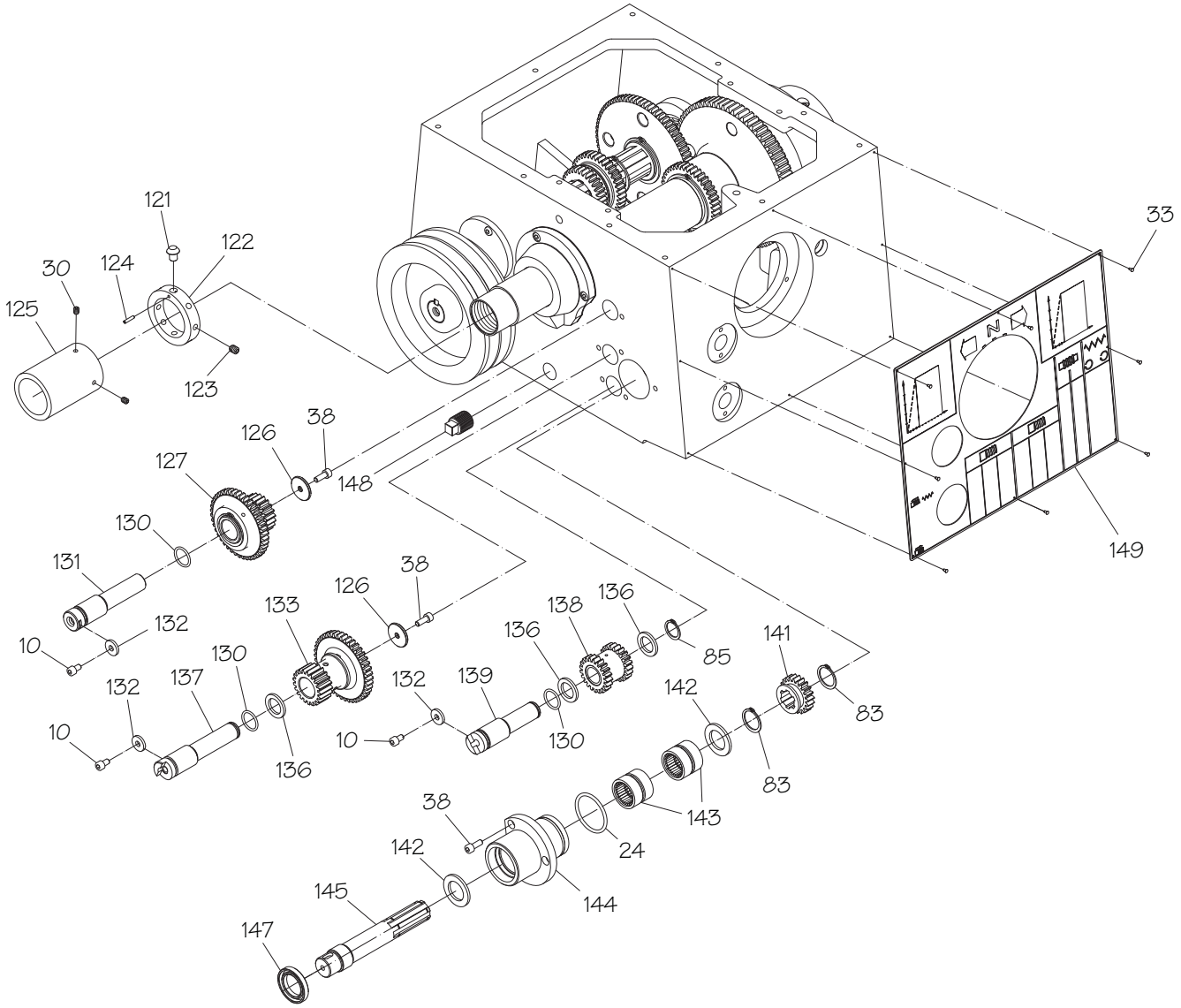


Headstock Internal Gears Parts List

REF	PART #	DESCRIPTION
38	PCAP01M	CAP SCREW M6-1 X 16
61	PSB10510061	OIL SEAL 30 X 62 X 12MM
62	PSB10510062	PULLEY FLAT WASHER 8MM
63	PLW04M	LOCK WASHER 8MM
64	PCAP31M	CAP SCREW M8-1.25 X 25
71	PSB10510071	SPLINE SHAFT END COVER
72	PORP055	O-RING 54.6 X 5.7 P55
73	PR15M	EXT RETAINING RING 30MM
74	P6206-OPEN	BALL BEARING 6206 OPEN
75	PR31M	EXT RETAINING RING 38MM
76	PSB10510076	SPLINE SHAFT
77	PSB10510077	COMBO GEAR ASSY 22T/76T
81	PSB10510081	GEAR 33T
82	P6205-OPEN	BALL BEARING 6205 OPEN
83	PR11M	EXT RETAINING RING 25MM
84	PSB10510084	BEARING SEAT
85	PR09M	EXT RETAINING RING 20MM
86	P6304-OPEN	BALL BEARING 6304 OPEN
88	PSB10510088	GEAR 38T
90	PSB10510090	SHAFT
91	PSB10510091	KEY 7 X 7 X 104
92	PSB10510092	KEY 7 X 7 X 53
93	PORP075	O-RING 74.6 X 5.7 P75
94	PSB10510094	FLANGE BEARING

REF	PART #	DESCRIPTION
95	PR38M	INT RETAINING RING 62MM
96	PSB10510096	SPINDLE PULLEY
97	PSB10510097	HEADSTOCK HOUSING
98	PSB10510098	SPINDLE D1-5 MT#5
99	PSB10510099	CAMLOCK STUD
100	PSB10510100	CAM COMPRESSION SPRING
101	PSB10510101	CAMLOCK CAP STEP SCREW
102	PSB10510102	CAMLOCK
103	PK162M	KEY 10 X 6 X 85
104	PK109M	KEY 7 X 7 X 35
105	PCAP07M	CAP SCREW M6-1 X 30
106	PSB10510106	BEARING COVER
107	PSB10510107	BEARING COVER GASKET
108	P30213	TAPERED BEARING 30213
109	PSB10510109	GEAR 72T
110	PSB10510110	GEAR 41T
111	PR71M	EXT RETAINING RING 60MM
112	PSB10510112	GEAR 42T
113	PR71M	EXT RETAINING RING 60MM
114	P32011	TAPERED BEARING 32011
115	PSB10510115	SPANNER NUT
116	PSB10510116	BEARING SEAT GASKET
117	PSB10510117	BEARING SEAT

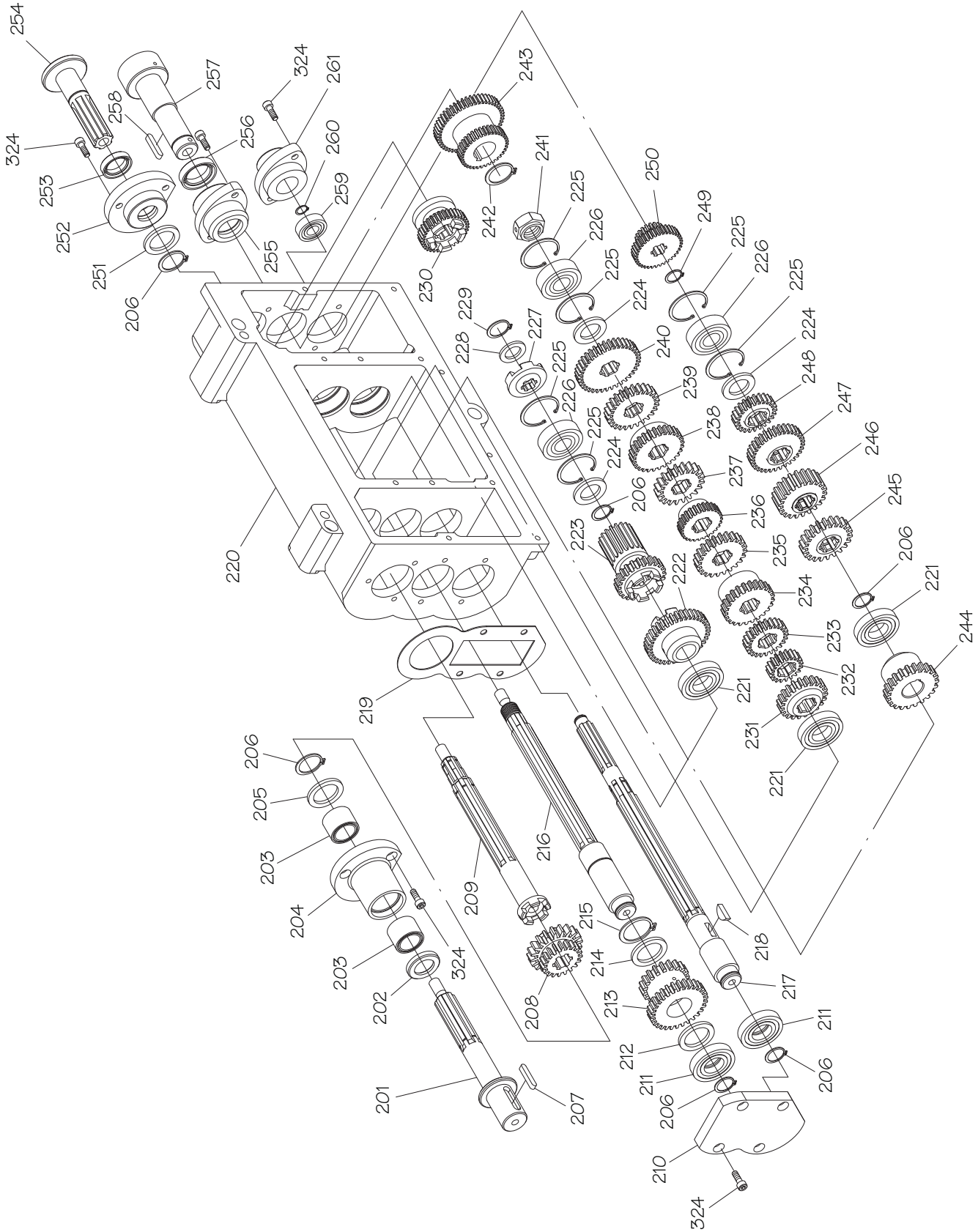
Headstock Transfer Gears



REF	PART #	DESCRIPTION
10	PCAP04M	CAP SCREW M6-1 X 10
24	PORP044	O-RING 43.7 X 3.5 P44
30	PSS20M	SET SCREW M8-1.25 X 8
33	PRIV009M	STEEL FLUTED RIVET 2 X 6MM
38	PCAP01M	CAP SCREW M6-1 X 16
83	PR11M	EXT RETAINING RING 25MM
85	PR09M	EXT RETAINING RING 20MM
121	PSB10510121	RPM SENSOR PIN
122	PSB10510122	RPM SENSOR RING
123	PSS30M	SET SCREW M10-1.5 X 10
124	PRP72M	ROLL PIN 3 X 15
125	PSB10510125	EXTENDED SLEEVE
126	PSB10510126	GEAR FLAT WASHER 6MM
127	PSB10510127	COMBO GEAR ASSY 21T/42T
130	PORP021	O-RING 20.8 X 2.4 P21

REF	PART #	DESCRIPTION
131	PSB10510131	SHAFT
132	PSB10510132	SHAFT FLAT WASHER 6MM
133	PSB10510133	COMBO GEAR ASSY 21T/42T
136	PSB10510136	SPACER
137	PSB10510137	SHAFT
138	PSB10510138	GEAR 21T
139	PSB10510139	SHAFT
141	PSB10510141	GEAR 21T
142	PSB10510142	SPACER
143	PSB10510143	NEEDLE ROLLER BEARING RNA-6904
144	PSB10510144	FLANGE BEARING
145	PSB10510145	SPLINE SHAFT
147	PSB10510147	OIL SEAL 28 X 44 X 07
148	PSB10510148	SQUARE HEAD PIPE PLUG 1/2"PT
149	PSB10510149	HEADSTOCK FRONT PANEL

Gearbox Gears

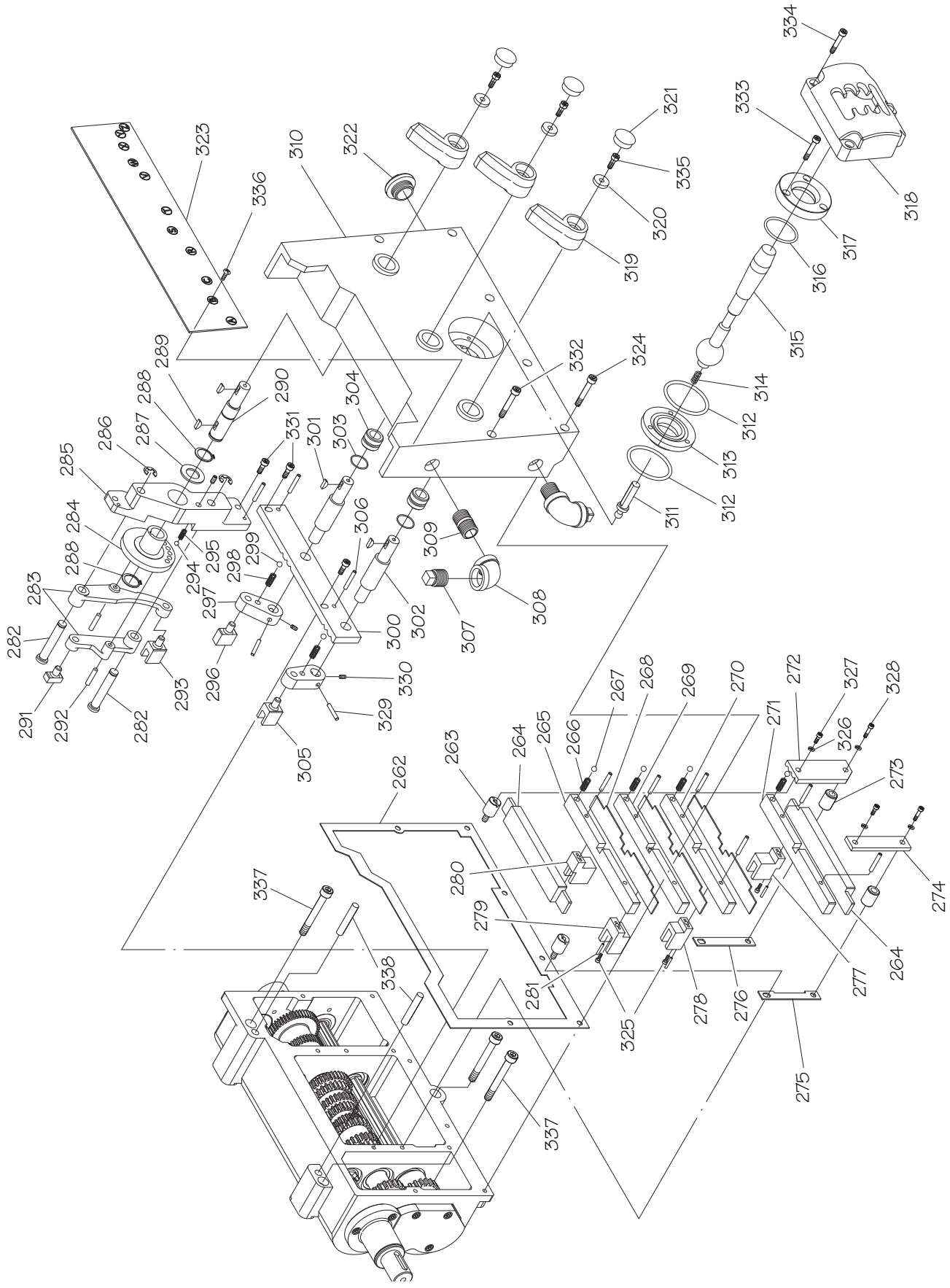


Gearbox Gears Parts List

REF	PART #	DESCRIPTION
201	PSB10510201	SPLINE SHAFT
202	PSB10510202	OIL SEAL 20 X 32 X 5
203	PSB10390203	NEEDLE ROLLER BEARING TAF202820
204	PSB10510204	FLANGE BEARING
205	PSB10510205	SPACER
206	PR09M	EXT RETAINING RING 20MM
207	PK109M	KEY 7 X 7 X 35
208	PSB10510208	COMBO GEAR 19T/20T
209	PSB10510209	SPLINE SHAFT
210	PSB10510210	END COVER
211	P16004-OPEN	BALL BEARING 16004-OPEN
212	PSB10510212	SPACER
213	PSB10510213	COMBO GEAR 19T/30T
214	PSB10510214	SPACER
215	PR11M	EXT RETAINING RING 25MM
216	PSB10510216	SPLINE SHAFT
217	PSB10510217	SPLINE SHAFT
218	PSB10510218	WOODRUFF KEY 5 X 19
219	PSB10510219	END COVER GASKET
220	PSB10510220	GEARBOX HOUSING
221	P16004-OPEN	BALL BEARING 16004-OPEN
222	PSB10510222	GEAR 38T
223	PSB10510223	COMBO GEAR 23T/19T
224	PSB10510224	SPACER
225	PR23M	INT RETAINING RING 40MM
226	P6203-OPEN	BALL BEARING 6203 OPEN
227	PSB10510227	CLUTCH
228	PSB10510228	SPACER
229	PR06M	EXT RETAINING RING 16MM
230	PSB10510230	GEAR 35T
231	PSB10510231	GEAR 22T

REF	PART #	DESCRIPTION
232	PSB10510232	GEAR 19T
233	PSB10510233	GEAR 20T
234	PSB10510234	GEAR 24T
235	PSB10510235	GEAR 23T
236	PSB10510236	GEAR 27T
237	PSB10510237	GEAR 24T
238	PSB10510238	GEAR 28T
239	PSB10510239	GEAR 26T
240	PSB10510240	GEAR 38T
241	PSB10510241	SPANNER NUT
242	PR10M	EXT RETAINING RING 22MM
243	PSB10510243	COMBO GEAR 36T/50T
244	PSB10510244	GEAR 22T
245	PSB10510245	GEAR 22T
246	PSB10510246	GEAR 22T
247	PSB10510247	GEAR 33T
248	PSB10510248	GEAR 22T
249	PR18M	EXT RETAINING RING 17MM
250	PSB10510250	COMBO GEAR 20T/36T
251	PSB10510251	SPACER
252	PSB10510252	FLANGE BEARING
253	PSB10510202	OIL SEAL 20 X 32 X 5
254	PSB10510254	SPLINE SHAFT
255	PSB10510255	FLANGE BEARING
256	PSB10510256	OIL SEAL 24 X 35 X 8
257	PSB10510257	SHAFT
258	PK15M	KEY 5 X 5 X 35
259	P6001-OPEN	BALL BEARING 6001 OPEN
260	PR03M	EXT RETAINING RING 12MM
261	PSB10510261	FLANGE BEARING
324	PCAP26M	CAP SCREW M6-1 X 12

Gearbox Controls

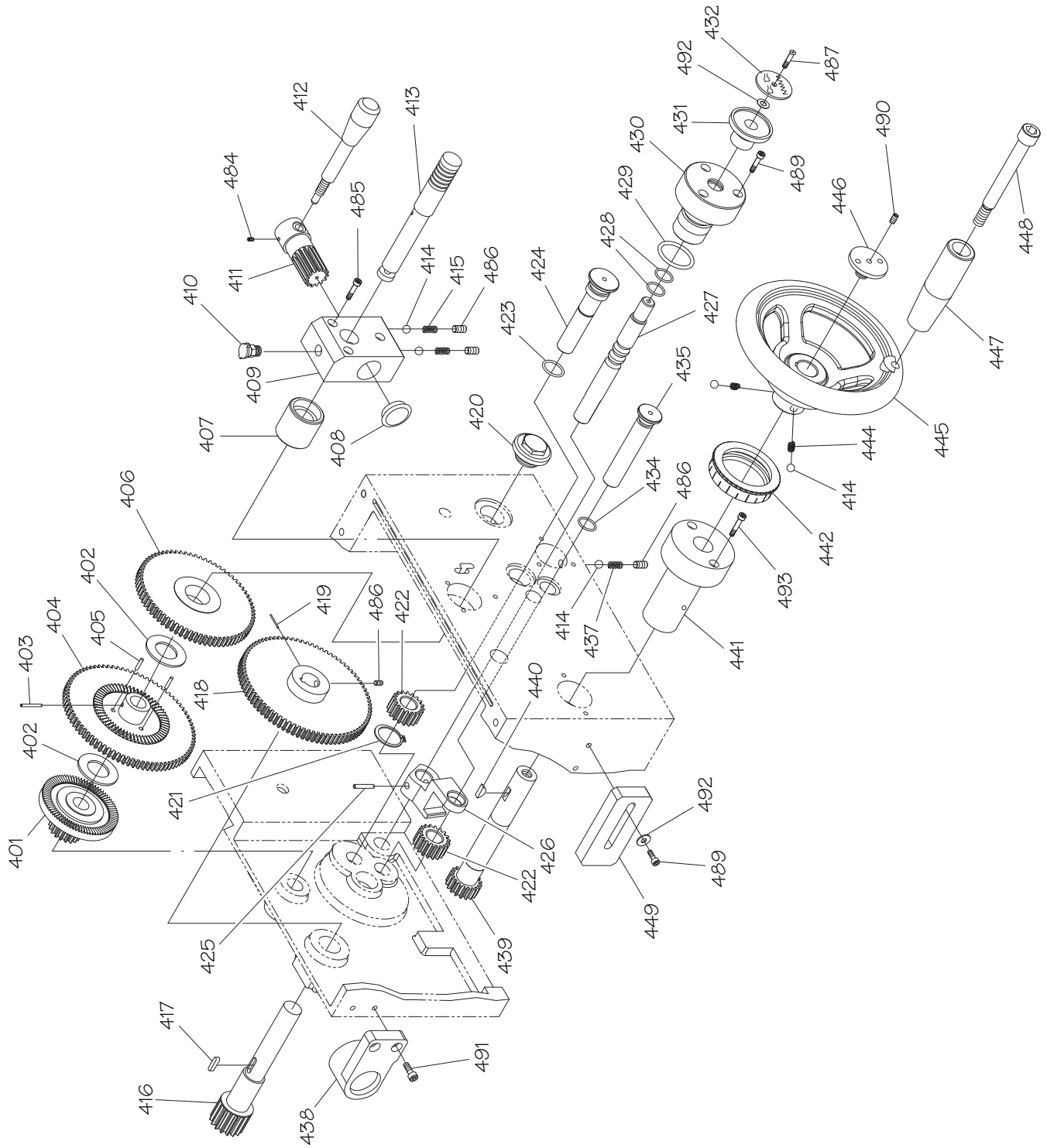


Gearbox Controls Parts List

REF	PART #	DESCRIPTION
262	PSB10510262	FRONT COVER GASKET
263	PSB10510263	JACKSCREW
264	PSB10510264	BINDING PLATE
265	PSB10510265	UPPER SHIFT FORK SUPPORT
266	PSB10510266	COMPRESSION SPRING 4 X 19
267	PSTB001	STEEL BALL 1/4"
268	PSB10510268	PARTITION
269	PSB10510269	UPPER MIDDLE SHIFT FORK SUPPORT
270	PSB10510270	LOWER MIDDLE SHIFT FORK SUPPORT
271	PSB10510271	LOWER SHIFT FORK SUPPORT
272	PSB10510272	REVERSE STOP PLATE
273	PSB10510273	SPACER
274	PSB10510274	SHOULDER PLATE
275	PSB10510275	INDENTED ALIGNMENT PLATE
276	PSB10510276	ALIGNMENT PLATE
277	PSB10510277	LOWER SHIFT FORK
278	PSB10510278	LOWER MIDDLE SHIFT FORK
279	PSB10510279	UPPER MIDDLE SHIFT FORK
280	PSB10510280	UPPER SHIFT FORK
281	PRP02M	ROLL PIN 3 X 16
282	PSB10510282	ROCKER ARM PIN
283	PSB10510283	ROCKER ARM ASSEMBLY
284	PSB10510284	CAM
285	PSB10510285	CAM BRACKET
286	PEC015M	E-CLIP 8MM
287	PSB10510287	SPACER
288	PR18M	EXT RETAINING RING 17MM
289	PSB10510289	WOODRUFF KEY 4 X 13
290	PSB10510290	SHIFT SHAFT
291	PSB10510291	SHIFT PAD
292	PSB10510292	DOWEL PIN
293	PSB10510293	SHIFT FORK
294	PSTB001	STEEL BALL 1/4"
295	PSB10510295	COMPRESSION SPRING 4 X 19
296	PSB10510296	SHIFT PAD
297	PSB10510297	PIVOT ARM
298	PSB10510298	COMPRESSION SPRING 6 X 13
299	PSTB001	STEEL BALL 1/4"
300	PSB10510300	SELECTOR BAR

REF	PART #	DESCRIPTION
301	PSB10510289	WOODRUFF KEY 4 X 13
302	PSB10510302	SHIFT SHAFT
303	PORP018	O-RING 17.8 X 2.4 P18
304	PSB10510304	BUSHING
305	PSB10510305	SHIFT FORK
306	PRP24M	ROLL PIN 5 X 16
307	PSB10510148	SQUARE HEAD PIPE PLUG 1/2"PT
308	PSB10510308	PIPE ELBOW 1/2"PT
309	PSB10510309	PIPE NIPPLE 1/2" X 1"PT
310	PSB10510310	GEARBOX FRONT COVER
311	PSB10510311	SELECTOR SHAFT
312	PORG040	O-RING 39.4 X 3.1 G40
313	PSB10510313	SELECTOR LEVER BRACKET
314	PSB10510314	COMPRESSION SPRING 9 X 38
315	PSB10510315	SELECTOR LEVER
316	PORG030	O-RING 3.1 X 29.4 G30
317	PSB10510317	SELECTOR LEVER SUPPORT
318	PSB10510318	SELECTOR LEVER PANEL
319	PSB10510319	QUICK CHANGE LEVER
320	PSB10510320	LEVER FLAT WASHER 5MM
321	PSB10510321	LEVER END PLUG
322	PSB10510055	OIL SIGHT GLASS 3/4"
323	PSB10510323	CHANGE GEAR LEVER PANEL
324	PCAP26M	CAP SCREW M6-1 X 12
325	PCAP15M	CAP SCREW M5-.8 X 20
326	PLW03M	LOCK WASHER 6MM
327	PCAP26M	CAP SCREW M6-1 X 12
328	PCAP48M	CAP SCREW M6-1 X 35
329	PRP04M	ROLL PIN 4 X 24
330	PSS03M	SET SCREW M6-1 X 8
331	PCAP02M	CAP SCREW M6-1 X 20
332	PCAP167M	CAP SCREW M6-1 X 70
333	PCAP38M	CAP SCREW M5-.8 X 25
334	PCAP26M	CAP SCREW M6-1 X 12
335	PCAP33M	CAP SCREW M5-.8 X 12
336	PS17M	PHLP HD SCR M4-.7 X 6
337	PCAP66M	CAP SCREW M8-1.25 X 65
338	PSB10510338	TAPER PIN #7 X 3-1/4"

Apron Front View

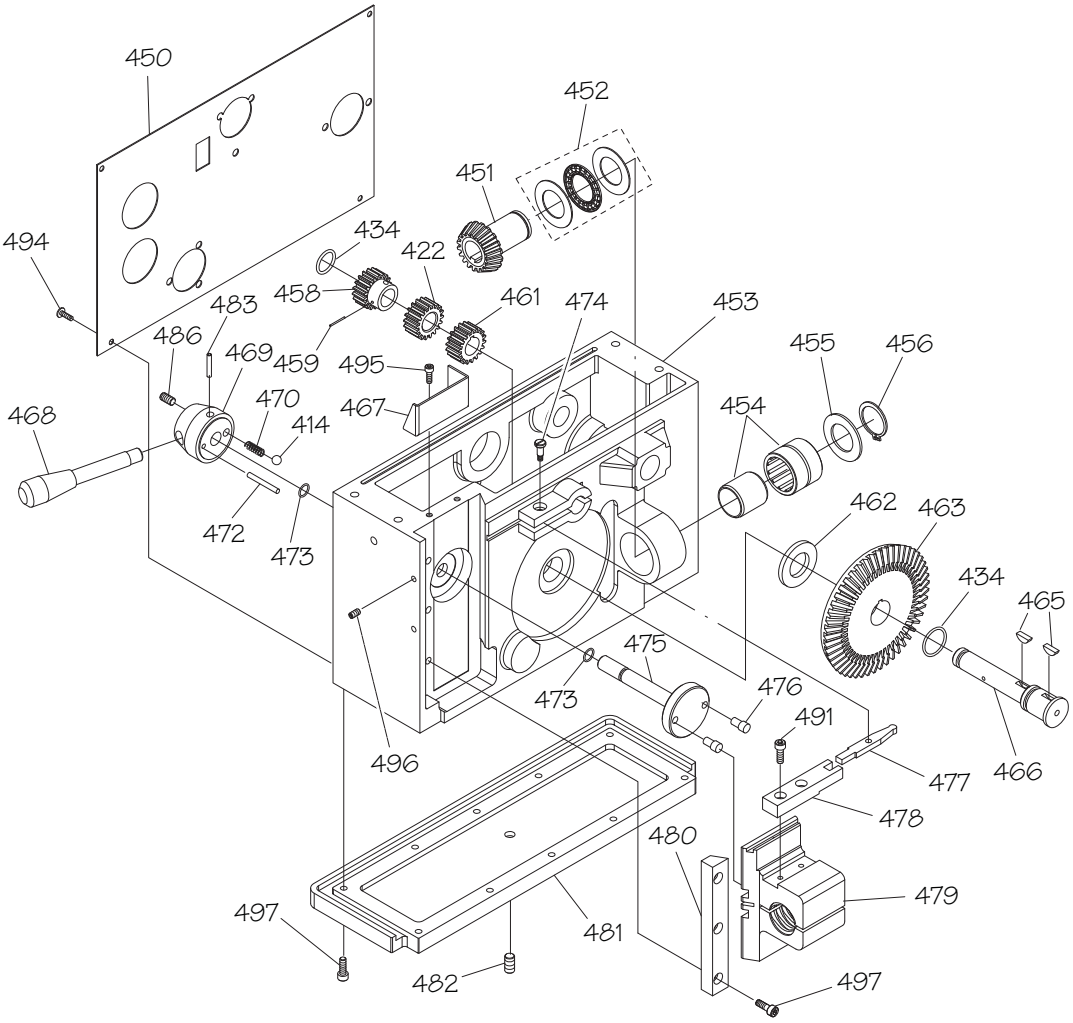


Apron Front View Parts List

REF	PART #	DESCRIPTION
401	PSB10510401	COMBO GEAR 18T/60T
402	PSB10510402	THRUST WASHER AS3047
403	PRP20M	ROLL PIN 4 X 22
404	PSB10510404	COMBO GEAR 81T/60T
405	PSB10510405	DOWEL PIN 4 X 17
406	PSB10510406	COMBO GEAR 72T/60T
407	PSB10510407	SLEEVE
408	PSB10510408	CASTING PLUG
409	PSB10510409	WORM GEAR HOUSING
410	PSB10510410	OIL CUP
411	PSB10510411	WORM SHAFT
412	PSB10510412	FEED SELECTION LEVER
413	PSB10510413	PINION SHAFT
414	PSTB001	STEEL BALL 1/4"
415	PSB10510298	COMPRESSION SPRING 6 X 13
416	PSB10510416	GEAR SHAFT 16T
417	PK14M	KEY 5 X 5 X 18
418	PSB10510418	GEAR 81T
419	PRP10M	ROLL PIN 5 X 36
420	PSB10510055	OIL SIGHT GLASS 3/4"
421	PR06M	EXT RETAINING RING 16MM
422	PSB10510422	GEAR 18T
423	PORP018	O-RING 17.8 X 2.4 P18
424	PSB10510424	SHAFT
425	PRP04M	ROLL PIN 4 X 24
426	PSB10510426	PIVOT ARM
427	PSB10510427	SHIFT SHAFT
428	PORP016	O-RING 15.8 X 2.4 P16

REF	PART #	DESCRIPTION
429	PORP026	O-RING 25.7 X 3.5 P26
430	PSB10510430	SHAFT BRACKET
431	PSB10510431	FEED DIRECTION KNOB
432	PSB10510432	FEED DIRECTION PLATE
434	PORP012	O-RING 11.8 X 2.4 P12
435	PSB10510435	SHAFT
437	PSB10510437	COMPRESSION SPRING 4 X 19
438	PSB10510438	LEADSCREW SUPPORT
439	PSB10510439	GEAR SHAFT 18T
440	PSB10510218	WOODRUFF KEY 5 X 19
441	PSB10510441	GEAR SHAFT BRACKET
442	PSB10510442	CARRIAGE GRADUATED DIAL
444	PSB10510298	COMPRESSION SPRING 6 X 13
445	PSB10510445	CARRIAGE HANDWHEEL
446	PSB10510446	HANDWHEEL END CAP
447	PSB10510447	HANDWHEEL HANDLE
448	PSB10510448	HANDLE BOLT
449	PSB10510449	CLUTCH STOP PLATE
484	PSS26M	SET SCREW M5-.8 X 6
485	PCAP79M	CAP SCREW M5-.8 X 35
486	PSS20M	SET SCREW M8-1.25 X 8
487	PS08M	PHLP HD SCR M5-.8 X 12
489	PCAP06M	CAP SCREW M6-1 X 25
490	PSS12M	SET SCREW M6-1 X 25
491	PCAP01M	CAP SCREW M6-1 X 16
492	PW03M	FLAT WASHER 6MM
493	PCAP38M	CAP SCREW M5-.8 X 25

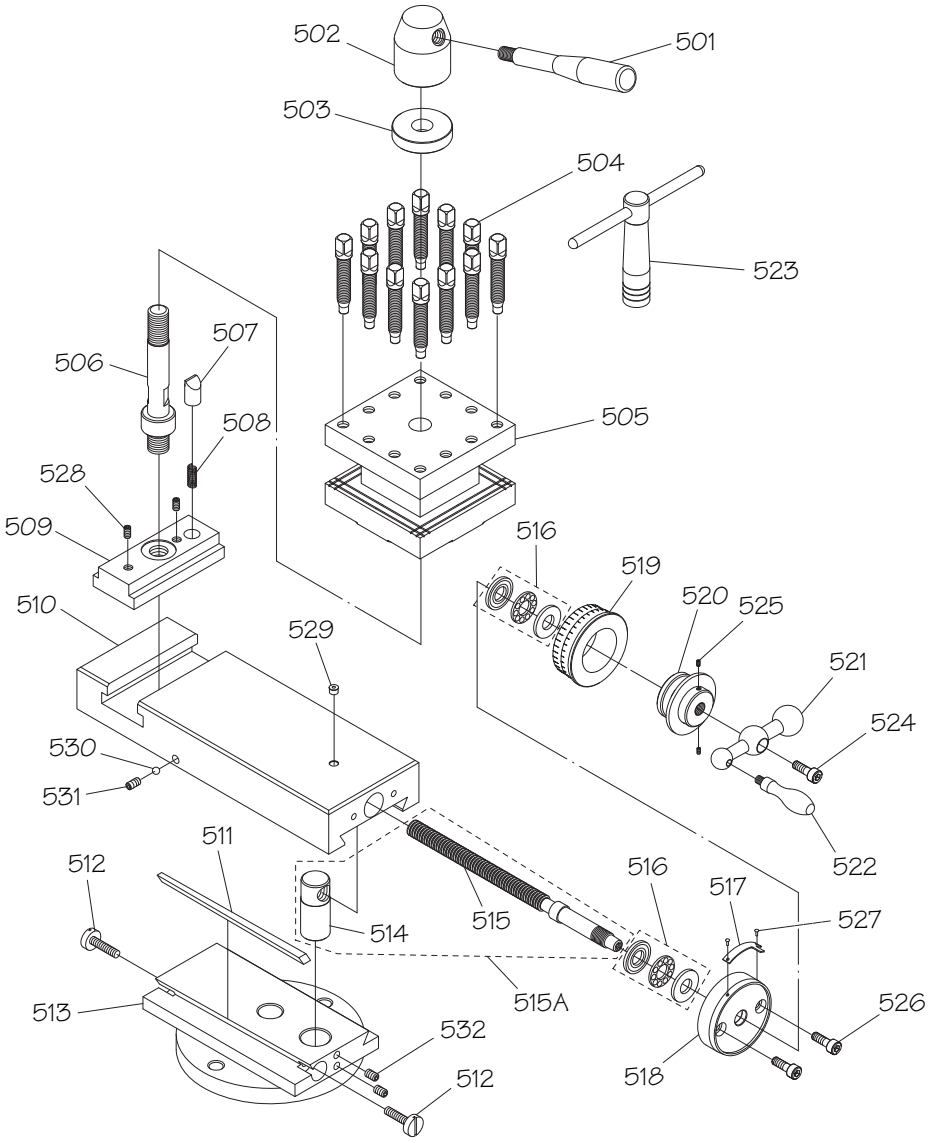
Apron Rear View



REF	PART #	DESCRIPTION
414	PSTB001	STEEL BALL 1/4"
422	PSB10510422	GEAR 18T
434	P0RP012	O-RING 11.8 X 2.4 P12
450	PSB10510450	APRON FRONT PANEL
451	PSB10510451	BEVEL GEAR SHAFT
452	PSB10120552	THRUST BEARING NTB/AS-2542
453	PSB10510453	APRON CASTING
454	PSB10510454	NEEDLE ROLLER BEARING NK29/30
455	PSB10510455	SPACER
456	PR11M	EXT RETAINING RING 25MM
458	PSB10510458	GEAR 18T
459	PRP88M	ROLL PIN 5 X 22
461	PSB10510461	GEAR 18T
462	PSB10510462	SPACER
463	PSB10510463	BEVEL GEAR 64T
465	PSB10510289	WOODRUFF KEY 4 X 13
466	PSB10510466	SHAFT
467	PSB10510467	OIL FENCE
468	PSB10510468	HALF NUT LEVER
469	PSB10510469	HUB

REF	PART #	DESCRIPTION
470	PSB10510470	COMPRESSION SPRING 6 X 27
472	PRP04M	ROLL PIN 4 X 24
473	P0RP020	O-RING 19.8 X 2.4 P20
474	PSB10510474	STEP SCREW
475	PSB10510475	CAM SHAFT
476	PSB10510476	STEP PIN
477	PSB10510477	ROCKER ARM
478	PSB10510478	PIVOT ARM
479	PSB10510479	HALF NUT
480	PSB10510480	HALF NUT GIB
481	PSB10510481	APRON BASE
482	PSB10510482	OIL DRAIN PLUG 1/8"PT
483	PRP102M	ROLL PIN 4 X 36
486	PSS20M	SET SCREW M8-1.25 X 8
491	PCAP01M	CAP SCREW M6-1 X 16
494	PS17M	PHLP HD SCR M4-.7 X 6
495	PCAP03M	CAP SCREW M5-.8 X 8
496	PSS02M	SET SCREW M6-1 X 6
497	PCAP28M	CAP SCREW M6-1 X 15

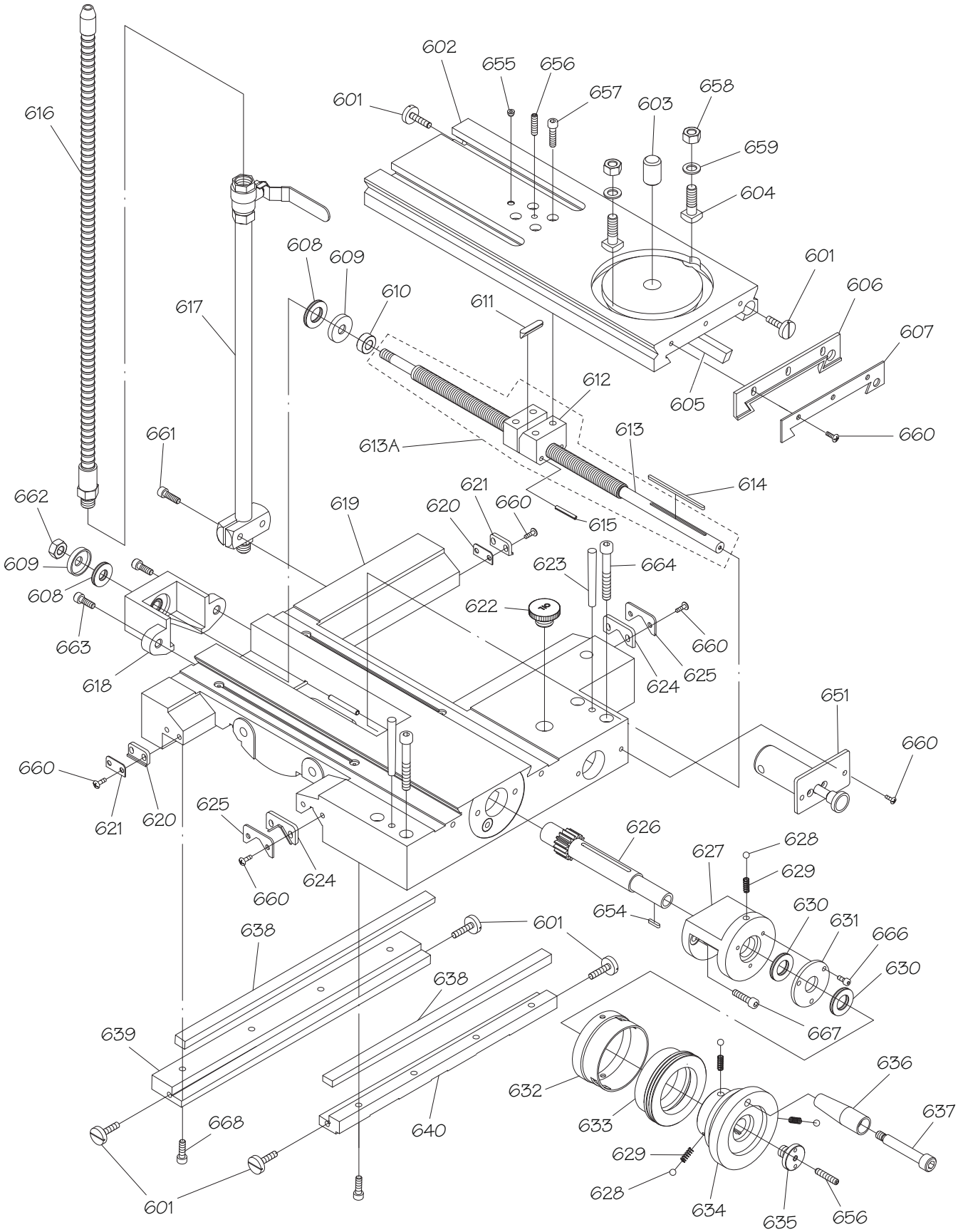
Compound Rest & Tool Post



REF	PART #	DESCRIPTION
501	PSB10510501	LEVER
502	PSB10510502	TOOL POST NUT
503	PSB10510503	COLLAR
504	PSB10510504	SQUARE HEAD TOOL POST BOLT
505	PSB10510505	TOOL POST BODY
506	PSB10510506	TOOL POST SHAFT
507	PSB10510507	ALIGNMENT PLUNGER
508	PSB10510508	COMPRESSION SPRING 6 X 27
509	PSB10510509	TOOL POST SLIDE BLOCK
510	PSB10510510	COMPOUND REST
511	PSB10510511	COMPOUND REST GIB
512	PSB10510512	GIB ADJUSTMENT SCREW
513	PSB10510513	COMPOUND REST SWIVEL BASE
514	PSB10510515A	LEADSCREW NUT
515A	PSB10510515A	LEADSCREW W/NUT ASSEMBLY
515	PSB10510515A	COMPOUND REST LEADSCREW
516	P51101	THRUST BEARING 51101

REF	PART #	DESCRIPTION
517	PSB10510517	INDICATOR PLATE
518	PSB10510518	LEADSCREW BRACKET
519	PSB10510519	COMPOUND REST GRADUATED DIAL
520	PSB10510520	BALL HANDLE HUB
521	PSB10510521	BALL HANDLE
522	PSB10510522	HANDLE
523	PSB10510523	TOOL POST WRENCH
524	PCAP04M	CAP SCREW M6-1 X 10
525	PSS03M	SET SCREW M6-1 X 8
526	PCAP02M	CAP SCREW M6-1 X 20
527	PRIV001M	STEEL FLUTED RIVET 2 X 5MM
528	PSS14M	SET SCREW M8-1.25 X 12
529	PLUBE001	TAP-IN BALL OILER 1/4"
530	PSTB001	STEEL BALL 1/4"
531	PSS16M	SET SCREW M8-1.25 X 10
532	PSS03M	SET SCREW M6-1 X 8

Saddle Top View

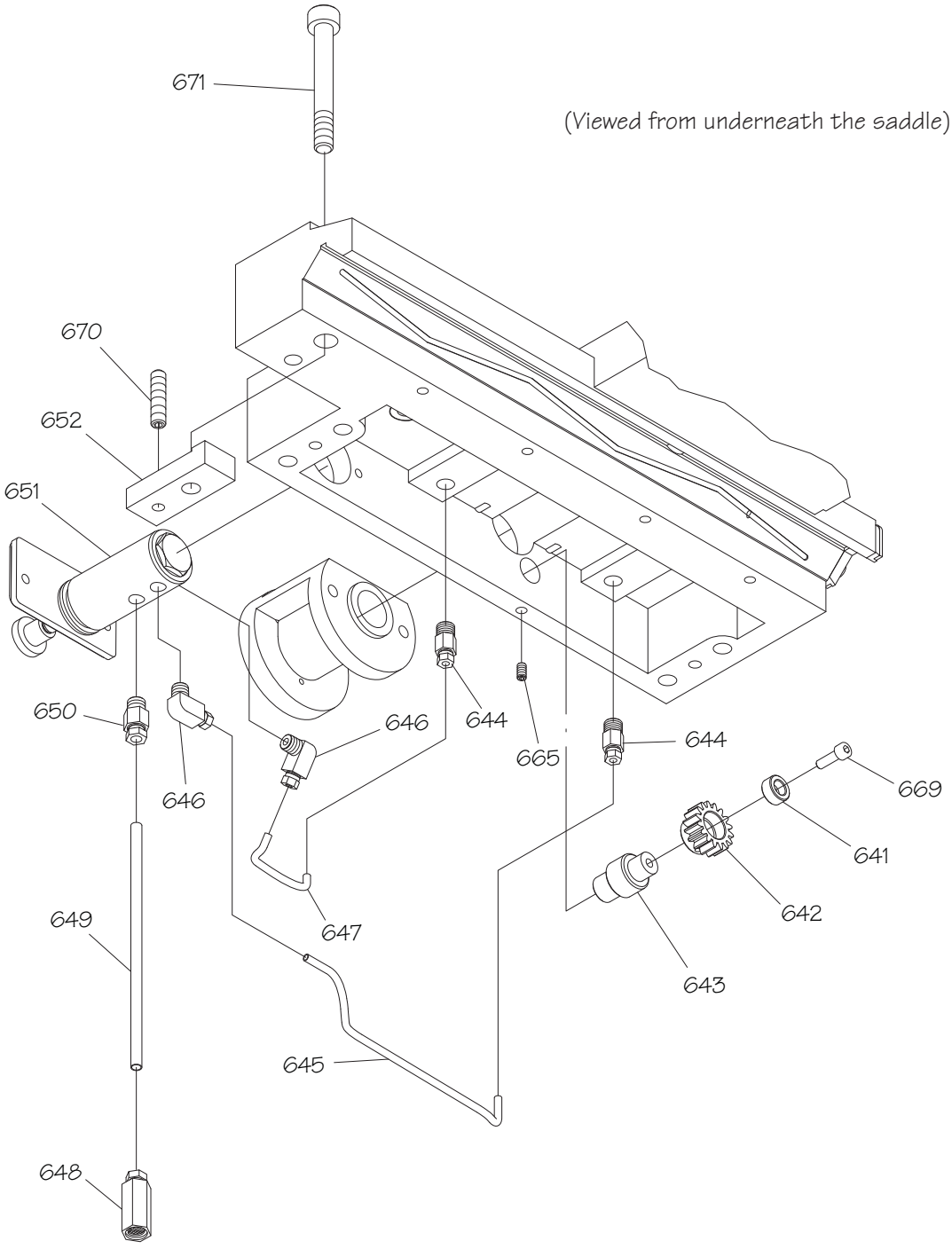


Saddle Top View Parts List

REF	PART #	DESCRIPTION
601	PSB10510601	GIB ADJUSTMENT SCREW
602	PSB10510602	CROSS SLIDE
603	PSB10510603	COMPOUND REST PIVOT PIN 18 X 28
604	PSB10510604	T-BOLT
605	PSB10510605	CROSS SLIDE GIB
606	PSB10510606	CROSS SLIDE WAY WIPER
607	PSB10510607	WAY WIPER PLATE
608	PSB10510608	THRUST WASHER NTB/AS2 1226
609	PSB10510609	THRUST WASHER CAP
610	PSB10510610	SPACER
611	PSB10510611	WEDGE KEY 7 X 7 X 30
612	PSB10510613A	LEADSCREW NUT
613A	PSB10510613A	LEADSCREW W/NUT ASSEMBLY
613	PSB10510613A	CROSS SLIDE LEADSCREW
614	PK168M	KEY 3 X 3 X 80
615	PRP28M	ROLL PIN 5 X 40
616	PSB10510616	COOLANT NOZZLE
617	PSB10510617	COOLANT STANDING PIPE W/VALVE
618	PSB10510618	LEADSCREW REAR BRACKET
619	PSB10510619	SADDLE
620	PSB10510620	STRAIGHT WAY WIPER
621	PSB10510621	STRAIGHT WAY WIPER PLATE
622	PSB10510622	OIL CAP 3/4" NF
623	PSB10390623	TAPER PIN #6 X 2-1/2
624	PSB10510624	V-WAY WIPER
625	PSB10510625	V-WAY WIPER PLATE
626	PSB10510626	CROSS SLIDE PINION
627	PSB10510627	PINION BRACKET

REF	PART #	DESCRIPTION
628	PSTB001	STEEL BALL 1/4"
629	PSB10510629	COMPRESSION SPRING 6 X 15
630	PSB10510630	THRUST WASHER NTB/AS2 1730
631	PSB10510631	RETAINING PLATE
632	PSB10510632	DIAL RING
633	PSB10510633	CROSS SLIDE GRADUATED DIAL
634	PSB10510634	HANDWHEEL
635	PSB10510635	HANDWHEEL END CAP
636	PSB10510636	HANDLE
637	PSB10510637	HANDLE BOLT
638	PSB10510638	CARRIAGE GIB
639	PSB10510639	REAR CARRIAGE GIB WAY
640	PSB10510640	FRONT CARRIAGE GIB WAY
651	PSB10510651	ONE-SHOT OILER ASSEMBLY
654	PK52M	KEY 3 X 3 X 15
655	PLUBE001	TAP-IN BALL OILER 1/4"
656	PSS28M	SET SCREW M6-1 X 30
657	PCAP07M	CAP SCREW M6-1 X 30
658	PN02M	HEX NUT M10-1.5
659	PW04M	FLAT WASHER 10MM
660	PS08M	PHLP HD SCR M5-.8 X 12
661	PCAP06M	CAP SCREW M6-1 X 25
662	PN02M	HEX NUT M10-1.5
663	PCAP02M	CAP SCREW M6-1 X 20
664	PCAP35M	CAP SCREW M8-1.25 X 60
666	PCAP17M	CAP SCREW M4-.7 X 10
667	PCAP02M	CAP SCREW M6-1 X 20
668	PCAP02M	CAP SCREW M6-1 X 20

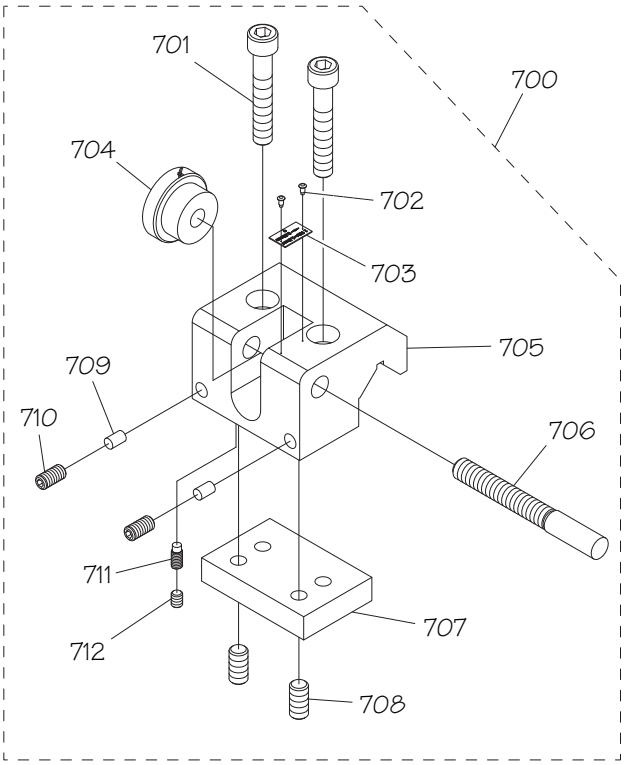
Saddle Bottom View



REF	PART #	DESCRIPTION
641	PSB10510641	SPACER 6.5 X 15 X 3
642	PSB10510642	GEAR 16T
643	PSB10510643	SHAFT
644	PSB10510644	STRAIGHT ADAPTER 1/8"PT X 4MM
645	PSB10510645	OIL TUBE 4 X 260MM ALUMINUM
646	PSB10510646	ELBOW ADAPTER 1/8"PT X 4MM
647	PSB10510647	OIL TUBE 4 X 120MM ALUMINUM
648	PSB10510648	OIL FILTER 6MM

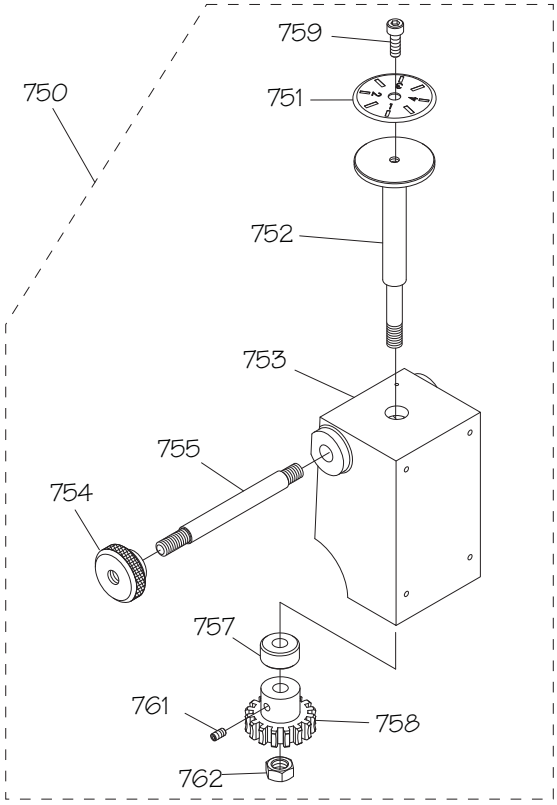
REF	PART #	DESCRIPTION
649	PSB10510649	OIL TUBE 6 X 160MM
650	PSB10510650	STRAIGHT ADAPTER 1/8"PT X 6MM
651	PSB10510651	ONE-SHOT OILER ASSEMBLY
652	PSB10510652	PUMP BRACKET
665	PSS03M	SET SCREW M6-1 X 8
669	PCAP24M	CAP SCREW M5-.8 X 16
670	PSS74M	SET SCREW M8-1.25 X 35
671	PCAP169M	CAP SCREW M12-1.75 X 75

Micrometer Stop



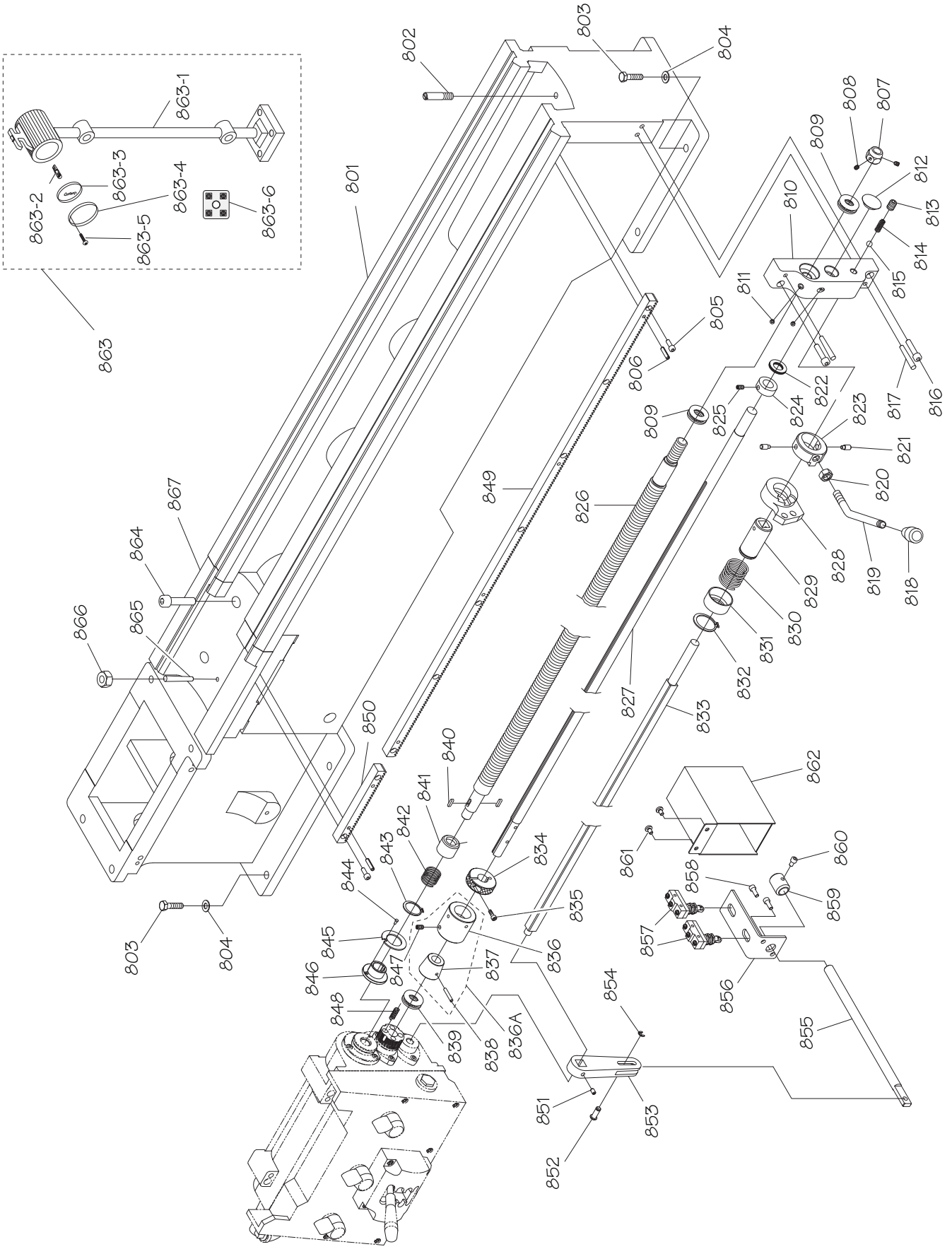
REF	PART #	DESCRIPTION
700	PSB10510700	MICROMETER STOP ASSEMBLY
701	PCAP71M	CAP SCREW M10-1.5 X 60
702	PRIV009M	STEEL FLUTED RIVET 2 X 6MM
703	PSB10510703	INDICATOR PLATE
704	PSB10510704	MICROMETER DIAL
705	PSB10510705	BODY
706	PSB10510706	MICROMETER STOP ROD
707	PSB10510707	CLAMPING PLATE
708	PSS10M	SET SCREW M10-1.5 X 20
709	PSB10510709	PLUG COPPER
710	PSS06M	SET SCREW M8-1.25 X 16
711	PSB10510711	DOG POINT SET SCREW M8-1.25 X 12
712	PSS14M	SET SCREW M8-1.25 X 12

Dial Indicator



REF	PART #	DESCRIPTION
750	PSB10510750	DIAL INDICATOR ASSEMBLY
751	PSB10510751	INDICATOR DIAL
752	PSB10510752	PIVOT STEM
753	PSB10510753	BODY
754	PSB10510754	KNURLED KNOB
755	PSB10510755	STUD-UDE M8-1.25 X 110 20/30
757	PSB10510757	SPACER
758	PSB10510758	GEAR 16T
759	PCAP04M	CAP SCREW M6-1 X 10
761	PSS02M	SET SCREW M6-1 X 6
762	PN03M	HEX NUT M8-1.25

Bed & Shafts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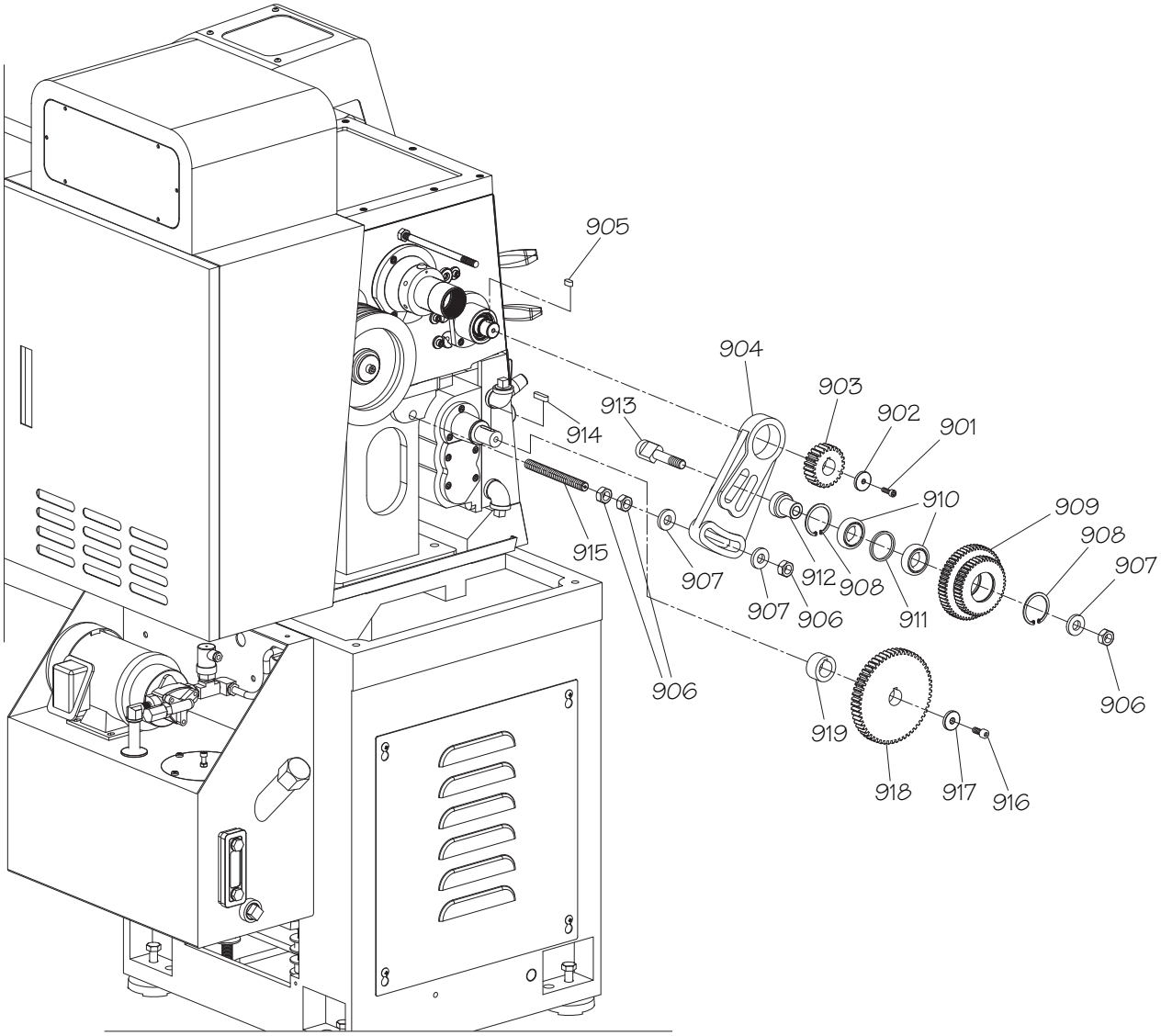
Bed & Shafts Parts List

REF	PART #	DESCRIPTION
801	PSB10510801	BED
802	PSB10510802	CARRIAGE STOP BOLT
803	PB24M	HEX BOLT M12-1.75 X 45
804	PW06M	FLAT WASHER 12MM
805	PCAP02M	CAP SCREW M6-1 X 20
806	PRP93M	ROLL PIN 6 X 25
807	PSB10510807	LEADSCREW LOCK NUT
808	PSS03M	SET SCREW M6-1 X 8
809	P51203	THRUST BEARING 51203
810	PSB10510810	SHAFT END BRACKET
811	PLUBE001	TAP-IN BALL OILER 1/4"
812	PSB10510812	CASTING PLUG
813	PSS15M	SET SCREW M12-1.75 X 12
814	PSB10510814	COMPRESSION SPRING
815	PSTB003	STEEL BALL 3/8"
816	PCAP40M	CAP SCREW M8-1.25 X 35
817	PSB10390817	TAPER PIN #6 X 2
818	PSB10510818	LEVER KNOB
819	PSB10510819	SPINDLE LEVER
820	PN09M	HEX NUT M12-1.75
821	PSB10510821	STEP PIN
822	PSB10510822	THRUST WASHER NTB/AS2 1831
823	PSB10510823	SPINDLE LEVER HUB
824	PSB10510824	LOCK COLLAR
825	PSS03M	SET SCREW M6-1 X 8
826	PSB10510826	LONGITUDINAL LEADSCREW
827	PSB10510827	FEED ROD
828	PSB10510828	SPINDLE LEVER INDENT BRACKET
829	PSB10510829	SPINDLE ROD SLEEVE
830	PSB10510830	COMPRESSION SPRING
831	PSB10510831	SPRING COVER
832	PR37M	EXT RETAINING RING 32MM
833	PSB10510833	SPINDLE ROD
834	PSB10510834	FEED ROD STOP
835	PCAP02M	CAP SCREW M6-1 X 20
836A	PSB10510836A	CLUTCH COLLAR ASSEMBLY
836	PSB10510836A	CLUTCH COLLAR
837	PSB10510836A	TAPERED BUSHING
838	PSB10510836A	TAPER PIN #4 X 1-1/4"
839	P51203	THRUST BEARING 51203
840	PK20M	KEY 5 X 5 X 15
841	PSB10510841	SPRING COVER
842	PSB10510842	COMPRESSION SPRING
843	PR37M	EXT RETAINING RING 32MM
844	PSB10121234	SHEAR PIN
845	PSB10510845	SHEAR PIN SHROUD
846	PSB10510846	LEADSCREW COLLAR
847	PSS02M	SET SCREW M6-1 X 6
848	PSB10510848	COMPRESSION SPRING 8 X 32
849	PSB10510849	BED RACK
850	PSB10510850	GAP RACK
851	PSS14M	SET SCREW M8-1.25 X 12
852	PSB10510852	CAPTIVE PIN
853	PSB10510853	PIVOT ARM
854	PEC09M	E-CLIP 6MM
855	PSB10510855	SPINDLE ROD LINKAGE SHAFT
856	PSB10510856	SPINDLE SWITCH BRACKET
857	PSB10490857	MICRO SWITCH TEND TM-1308
858	PCAP01M	CAP SCREW M6-1 X 16
859	PSB10510859	LOCK COLLAR
860	PCAP04M	CAP SCREW M6-1 X 10
861	PS68M	PHLP HD SCR M6-1 X 10
862	PSB10510862	SPINDLE SWITCH COVER
863	PSB10510863	HALOGEN LAMP ASSEMBLY
863-1	PSB10510863-1	LAMP BODY
863-2	PBULB3	HALOGEN BULB 24V
863-3	PSB10510863-3	LENS
863-4	PSB10510863-4	LENS RETAINER
863-5	PS55M	PHLP HD SCR M3-.5 X 10
863-6	PSB10510863-6	LAMP TERMINAL BLOCK 2P
864	PCAP64M	CAP SCREW M10-1.5 X 25
865	PSB10510865	GAP INSERT THREADED TAPER PIN
866	PN03M	HEX NUT M8-1.25
867	PSB10510867	GAP INSERT

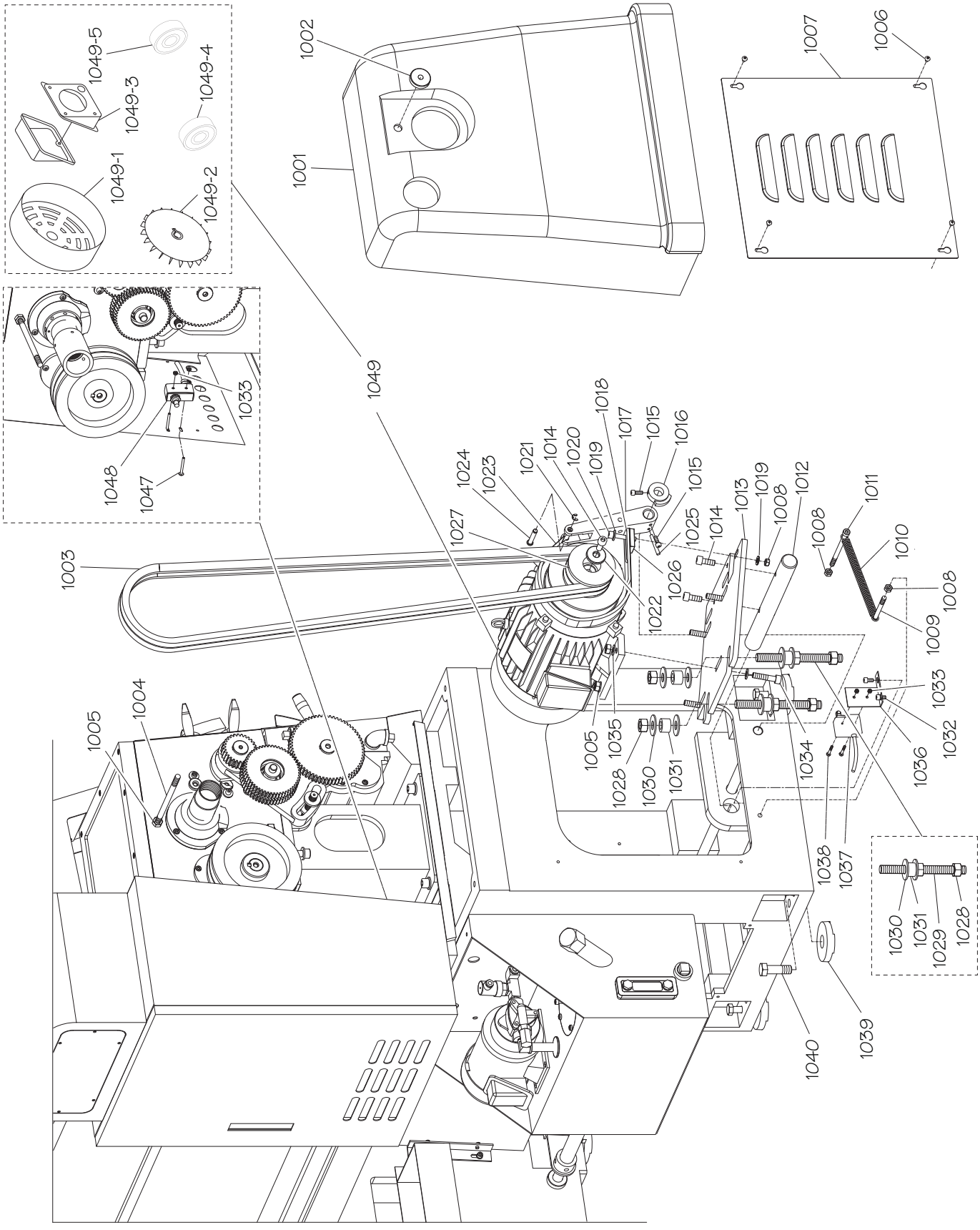
End Gears



REF	PART #	DESCRIPTION
901	PCAP02M	CAP SCREW M6-1 X 20
902	PSB10510902	GEAR FLAT WASHER 6MM
903	PSB10510903	GEAR 24T
904	PSB10510904	PIVOT FRAME
905	PK166M	KEY 7 X 7 X 15
906	PN09M	HEX NUT M12-1.75
907	PSB10510907	GEAR FLAT WASHER 12MM
908	PR25M	INT RETAINING RING 47MM
909	PSB10510909	COMBO GEAR 44T/56T
910	P6005ZZ	BALL BEARING 6005ZZ

REF	PART #	DESCRIPTION
911	PSB10510911	SPACER
912	PSB10510912	SHAFT COLLAR
913	PSB10510913	GEAR SHAFT
914	PK28M	KEY 7 X 7 X 30
915	PSB10510915	STUD-FT M12-1.75 X 150
916	PCAP14M	CAP SCREW M8-1.25 X 20
917	PSB10510917	GEAR FLAT WASHER 8MM
918	PSB10510918	GEAR 57T
919	PSB10510919	SPACER

Motor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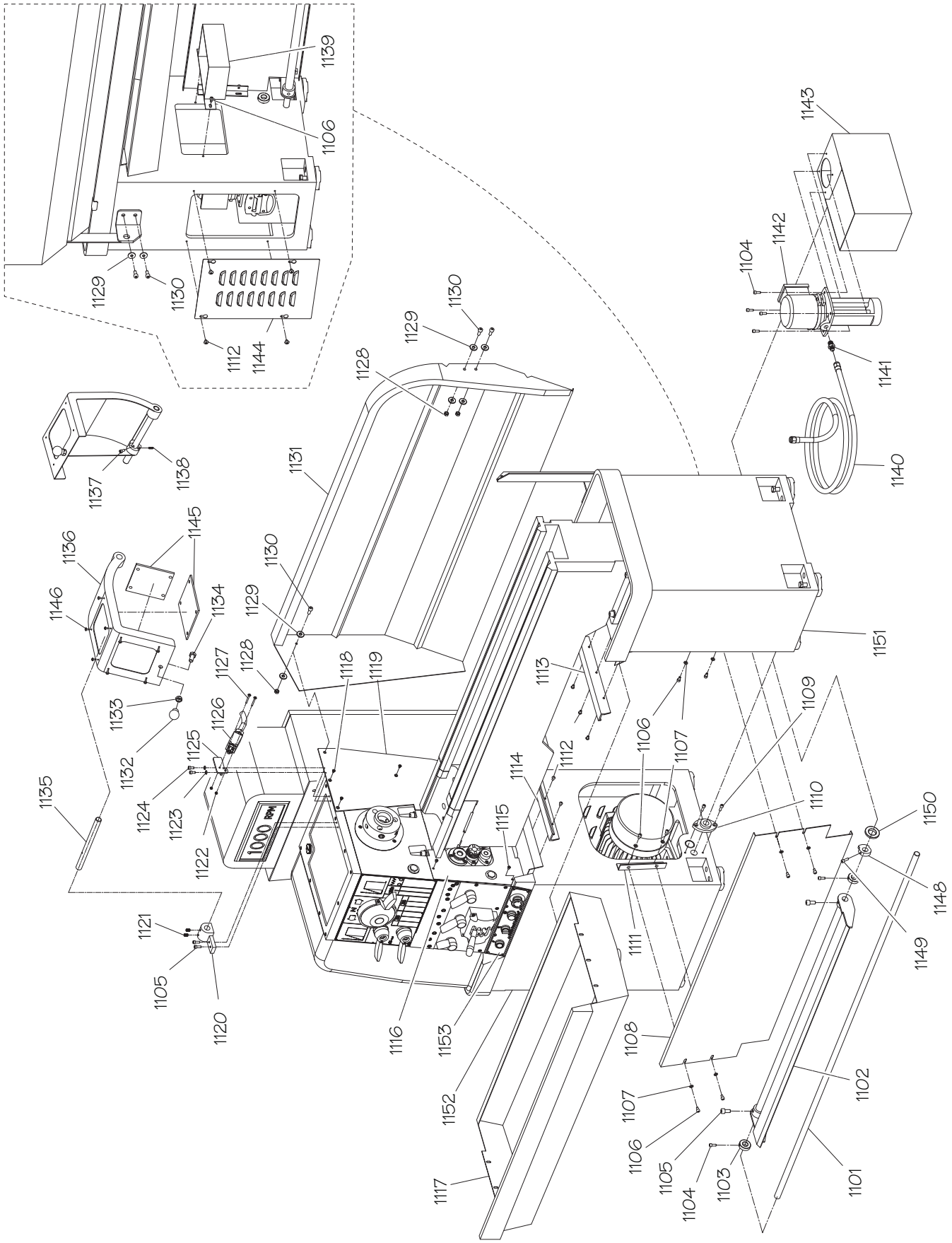
Motor Parts List

REF	PART #	DESCRIPTION
1001	PSB10511001	END GEAR COVER
1002	PSB10511002	KNURLED KNOB M10-1.5
1003	PVB76	V-BELT B76
1004	PSB10511004	STUD-DE M10-1.5 X 200 20/20
1005	PN02M	HEX NUT M10-1.5
1006	PS68M	PHLP HD SCR M6-1 X 10
1007	PSB10511007	MOTOR ACCESS COVER
1008	PN03M	HEX NUT M8-1.25
1009	PSB10511009	CAPTIVE SPRING BOLT
1010	PSB10511010	EXTENSION SPRING
1011	PCAP191M	CAP SCREW M8-1.25 X 120
1012	PSB10511012	MOTOR MOUNT SHAFT
1013	PSB10511013	MOTOR MOUNT
1014	PCAP64M	CAP SCREW M10-1.5 X 25
1015	PCAP01M	CAP SCREW M6-1 X 16
1016	PSB10511016	BRAKE CAM
1017	PSB10511017	BRAKE PIVOT ARM
1018	PSB10511018	BRAKE BELT BRACKET
1019	PW01M	FLAT WASHER 8MM
1020	PCAP45M	CAP SCREW M8-1.25 X 45
1021	PEC015M	E-CLIP 8MM
1022	PSB10511022	BRAKE PULLEY FLAT WASHER 10MM
1023	PSB10511023	BRAKE BELT
1024	PSB10511024	CAPTIVE PIN

REF	PART #	DESCRIPTION
1025	PSB10391025	TAPER PIN #4 X 1-3/4
1026	PSB10511026	BRAKE BRACKET MOUNT
1027	PSB10511027	MOTOR PULLEY
1028	PN13M	HEX NUT M16-2
1029	PSB10511029	STUD-FT M16-2 X 170
1030	PWF16M	FENDER WASHER 16MM
1031	PSB10511031	STUD CUSHION RUBBER
1032	PCAP26M	CAP SCREW M6-1 X 12
1033	PN04M	HEX NUT M4-.7
1034	PCAP70M	CAP SCREW M10-1.5 X 45
1035	PW04M	FLAT WASHER 10MM
1036	PSB10511036	BRAKE SWITCH BRACKET
1037	PSB10491137	MICRO SWITCH TEND TM-1704
1038	PS51M	PHLP HD SCR M4-.7 X 30
1039	PSB10511039	FOOT PAD CAST IRON
1040	PB51M	HEX BOLT M16-2 X 50
1047	PS65M	PHLP HD SCR M4-.7 X 40
1048	PSB10491148	MICRO SWITCH TEND TM-1307
1049	PSB10511049	MOTOR 5HP 220V 3PH
1049-1	PSB10511049-1	MOTOR FAN COVER
1049-2	PSB10511049-2	MOTOR FAN
1049-3	PSB10511049-3	MOTOR JUNCTION BOX
1049-4	PSB10511049-4	MOTOR FRONT BEARING
1049-5	PSB10511049-5	MOTOR REAR BEARING

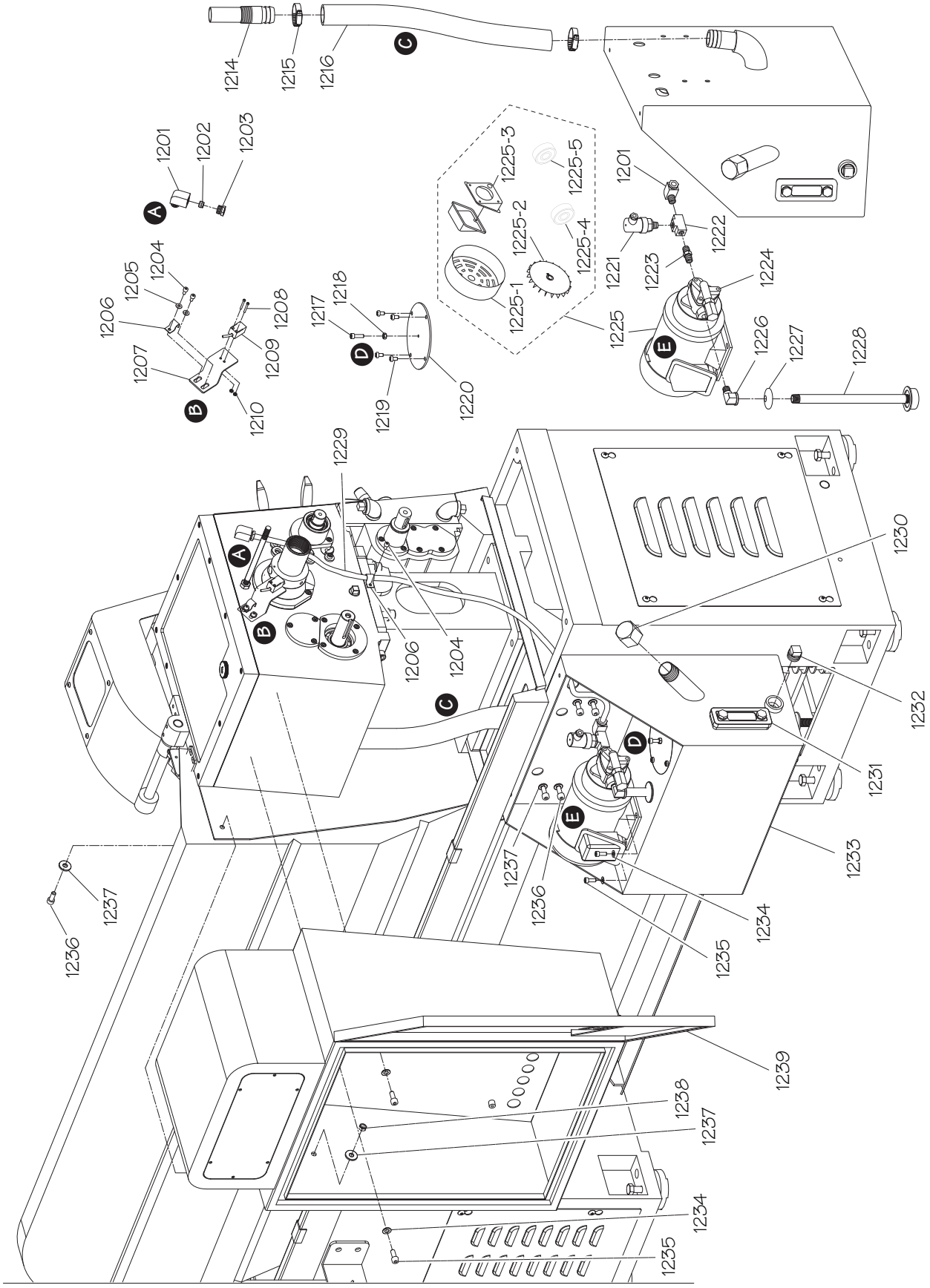
Stands & Panels



Cabinets & Panels Parts List

REF	PART #	DESCRIPTION
1101	PSB10511101	BRAKE PEDAL ROD
1102	PSB10511102	BRAKE PEDAL
1103	PSB10511103	LOCK COLLAR
1104	PCAP01M	CAP SCREW M6-1 X 16
1105	PB56M	CAP SCREW M10-1.5 X 20
1106	PCAP04M	CAP SCREW M6-1 X 10
1107	PW03M	FLAT WASHER 6MM
1108	PSB10511108	CENTER PANEL
1109	PCAP02M	CAP SCREW M6-1 X 20
1110	PSB10511110	FLANGE BEARING
1111	PSB10511111	CENTER PANEL BRACKET
1112	PS68M	PHLP HD SCR M6-1 X 10
1113	PSB10511113	CHIP TRAY RIGHT SLIDE
1114	PSB10511114	CHIP TRAY LEFT SLIDE
1115	PS05M	PHLP HD SCR M5-.8 X 8
1116	PSB10511116	RIGHT FRONT HEADSTOCK COVER
1117	PSB10511117	CHIP TRAY
1118	PFH30M	FLAT HD SCR M5-.8 X 8
1119	PSB10511119	RIGHT REAR HEADSTOCK COVER
1120	PSB10511120	CHUCK GUARD PIVOT BRACKET
1121	PSS14M	SET SCREW M8-1.25 X 12
1122	PN04M	HEX NUT M4-.7
1123	PLW03M	LOCK WASHER 6MM
1124	PCAP26M	CAP SCREW M6-1 X 12
1125	PSB10511125	SAFETY SWITCH BRACKET
1126	PSB10491226	LIMIT SWITCH TEND TZ-9212
1127	PS65M	PHLP HD SCR M4-.7 X 40
1128	PN03M	HEX NUT M8-1.25
1129	PW01M	FLAT WASHER 8MM
1130	PCAP14M	CAP SCREW M8-1.25 X 20
1131	PSB10511131	BACK SPLASH
1132	PSB10511132	KNOB M12-1.75
1133	PN09M	HEX NUT M12-1.75
1134	PCAP129M	CAP SCREW M12-1.75 X 20
1135	PSB10511135	CHUCK GUARD PIVOT ROD
1136	PSB10511136	CHUCK GUARD FRAME
1137	PCAP26M	CAP SCREW M6-1 X 12
1138	PSS34M	SET SCREW M5-.8 X 16
1139	PSB10511139	COOLANT CHUTE
1140	PSB10511140	COOLANT HOSE 3/8" X 72" CT801
1141	PSB10511141	HOSE ADAPTER 3/8"PT X 3/8"PH
1142	PSB10511142	COOLANT PUMP MOTOR 1/8HP 220V 3PH
1143	PSB10511143	COOLANT TANK
1144	PSB10511144	COOLANT TANK ACCESS COVER
1145	PSB10511145	CHUCK GUARD WINDOW PLEXIGLASS
1146	PS14M	PHLP HD SCR M6-1 X 12
1148	PSB10511148	BRAKE PEDAL CAM
1149	PCAP06M	CAP SCREW M6-1 X 25
1150	PSB10511150	THRUST WASHER 19.5 X 40MM T3
1151	PSB10511151	RIGHT STAND
1152	PSB10511152	LEFT STAND
1153	PSB10511153	CONTROL PANEL PLATE

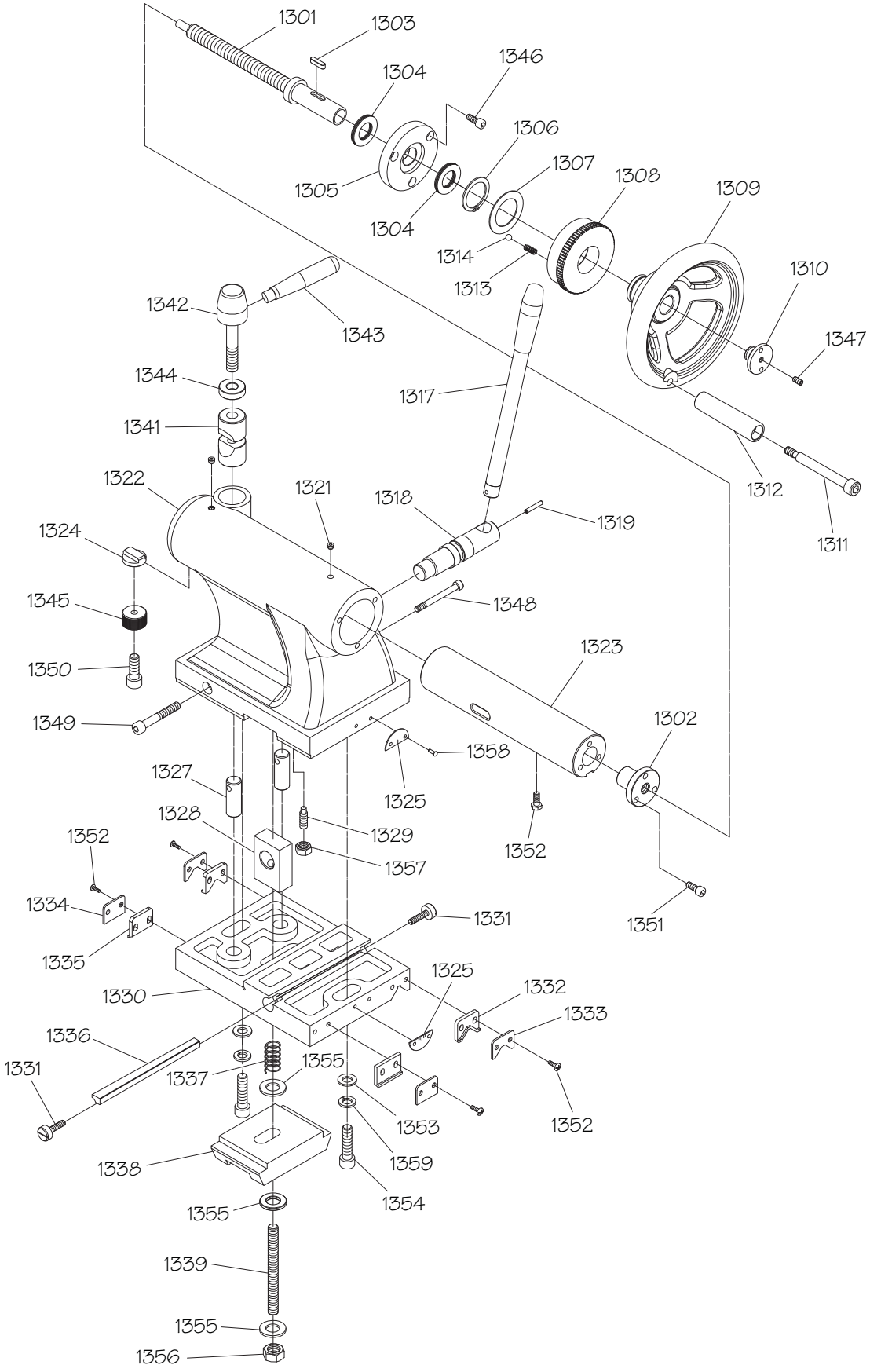
Headstock Lubrication System



Headstock Lubrication System Parts List

REF	PART #	DESCRIPTION
1201	PSB10511201	OIL TUBE ELBOW ADAPATER 3/8"PT X M6-1
1202	PSB10511202	OIL TUBE SEAL
1203	PSB10511203	OIL TUBE SEAL NUT
1204	PCAP50M	CAP SCREW M5-.8 X 10
1205	PW02M	FLAT WASHER 5MM
1206	PSB10511206	CORD CLAMP 10MM
1207	PSB10511207	RPM SENSOR BRACKET
1208	PS34	PHLP HD SCR M3-.5 X 25
1209	PSB10511209	RPM SENSOR FQP2-1604N-3U2
1210	PN07M	HEX NUT M3-.5
1214	PSB10511214	OIL FILTER
1215	PSB10511215	HOSE CLAMP 1-1/2"
1216	PSB10511216	OIL DRAIN HOSE 1-1/4" X 17"
1217	PCAP02M	CAP SCREW M6-1 X 20
1218	PN01M	HEX NUT M6-1
1219	PCAP04M	CAP SCREW M6-1 X 10
1220	PSB10511220	OIL TANK ACCESS COVER
1221	PSB10511221	OIL PRESSURE SENSOR
1222	PSB10511222	PIPE T-JOINT 1/4"PT
1223	PSB10511223	PIPE UNION 1/4"PT X 1/4"PT
1224	PSB10511224	LUBRICATION PUMP AM6
1225	PSB10511225	LUBRICATION MOTOR 1/4HP 220V 3PH
1225-1	PSB10511225-1	MOTOR FAN COVER
1225-2	PSB10511225-2	MOTOR FAN
1225-3	PSB10511225-3	MOTOR JUNCTION BOX
1225-4	PSB10511225-4	MOTOR FRONT BEARING
1225-5	PSB10511225-5	MOTOR REAR BEARING
1226	PSB10511226	PIPE ELBOW 1/4"PT X 1/4"PT
1227	PSB10511227	STAND PIPE SEAL
1228	PSB10511228	STAND PIPE W/FILTER 3/8PT X 9-1/2"
1229	PSB10511229	OIL TUBE 10 X 100MM NYLON
1230	PSB10511230	OIL FILL CAP
1231	PSB10511231	OIL SIGHT GLASS ASSEMBLY
1232	PSB10511232	PIPE PLUG 3/4PT
1233	PSB10511233	OIL TANK
1234	PW03M	FLAT WASHER 6MM
1235	PCAP01M	CAP SCREW M6-1 X 16
1236	PCAP14M	CAP SCREW M8-1.25 X 20
1237	PW01M	FLAT WASHER 8MM
1238	PN03M	HEX NUT M8-1.25
1239	PSB10511239	ELECTRICAL CABINET W/DOOR ASSY

Tailstock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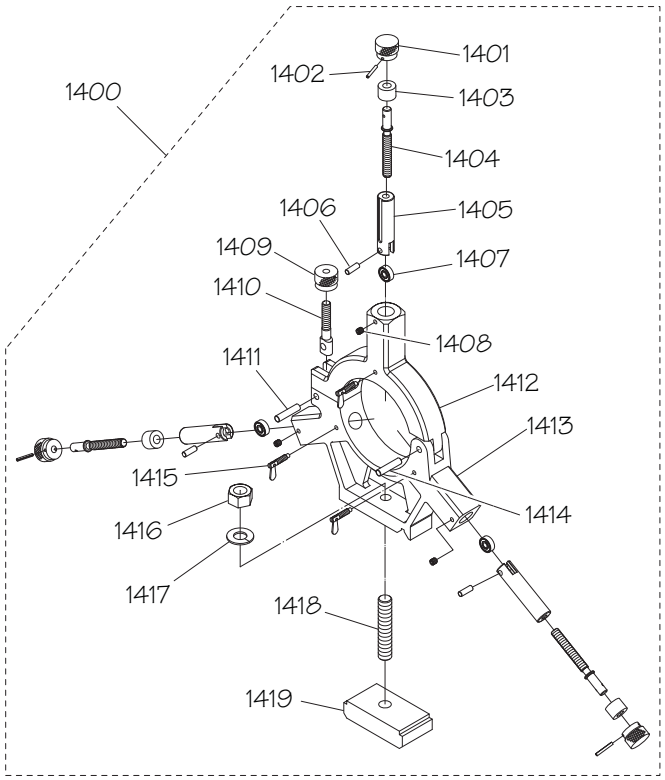
Tailstock Parts List

REF	PART #	DESCRIPTION
1301	PSB10511301	TAILSTOCK LEADSCREW
1302	PSB10511302	LEADSCREW NUT
1303	PK34M	KEY 5 X 5 X 20
1304	PSB10511304	THRUST BEARING NTB/AS2035
1305	PSB10511305	BEARING SEAT
1306	PR37M	EXT RETAINING RING 32MM
1307	PSB10511307	SPACER
1308	PSB10511308	QUILL GRADUATED DIAL
1309	PSB10511309	QUILL HANDWHEEL
1310	PSB10511310	HANDWHEEL END CAP
1311	PSB10511311	HANDLE CAP SCREW M8-1.25 X 90
1312	PSB10511312	HANDLE
1313	PSB10511313	COMPRESSION SPRING 6.2 X 16
1314	PSTB001	STEEL BALL 1/4"
1317	PSB10511317	TAILSTOCK LOCK LEVER
1318	PSB10511318	ECCENTRIC LOCK SHAFT
1319	PRP04M	ROLL PIN 4 X 24
1321	PLUBE001	TAP-IN BALL OILER 1/4"
1322	PSB10511322	TAILSTOCK CASTING
1323	PSB10511323	QUILL
1324	PSB10511324	QUILL GUIDE KEY
1325	PSB10511325	OFFSET INDICATOR SCALE 2PC
1327	PSB10511327	OFFSET ALIGNMENT PIN
1328	PSB10511328	ALIGNMENT BLOCK
1329	PSB10511329	DOG POINT SET SCREW M8-1.25 X 25
1330	PSB10511330	TAILSTOCK BASE
1331	PSB10511331	GIB ADJUSTMENT SCREW

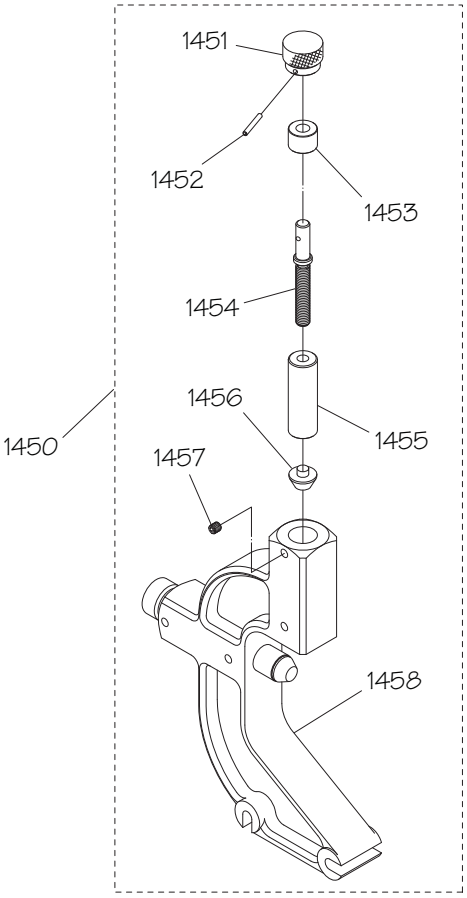
REF	PART #	DESCRIPTION
1332	PSB10511332	V-WAY WIPER
1333	PSB10511333	V-WAY WIPER PLATE
1334	PSB10511334	STRAIGHT WIPER PLATE
1335	PSB10511335	STRAIGHT WAY WIPER
1336	PSB10511336	TAILSTOCK GIB
1337	PSB10511337	COMPRESSION SPRING 25 X 45
1338	PSB10511338	CLAMP PLATE
1339	PSB10511339	STUD-FT M14-2 X 110
1341	PSB10511341	QUILL CLAMP PLUNGER 2PC
1342	PSB10511342	QUILL CLAMP SCREW
1343	PSB10511343	QUILL LOCK LEVER
1344	PSB10511344	CLAMP PLUNGER FLAT WASHER 12MM
1345	PSB10511345	GUIDE KEY BASE
1346	PCAP01M	CAP SCREW M6-1 X 16
1347	PSS04M	SET SCREW M6-1 X 12
1348	PCAP128M	CAP SCREW M8-1.25 X 70
1349	PCAP35M	CAP SCREW M8-1.25 X 60
1350	PCAP68M	CAP SCREW M6-1 X 8
1351	PCAP01M	CAP SCREW M6-1 X 16
1352	PS08M	PHLP HD SCR M5-.8 X 12
1353	PW04M	FLAT WASHER 10MM
1354	PB31M	HEX BOLT M10-1.5 X 40
1355	PW10M	FLAT WASHER 14MM
1356	PN32M	HEX NUT M14-2
1357	PN03M	HEX NUT M8-1.25
1358	PRIV001M	STEEL FLUTED RIVET 2 X 5MM
1359	PLW06M	LOCK WASHER 10MM

Steady Rest



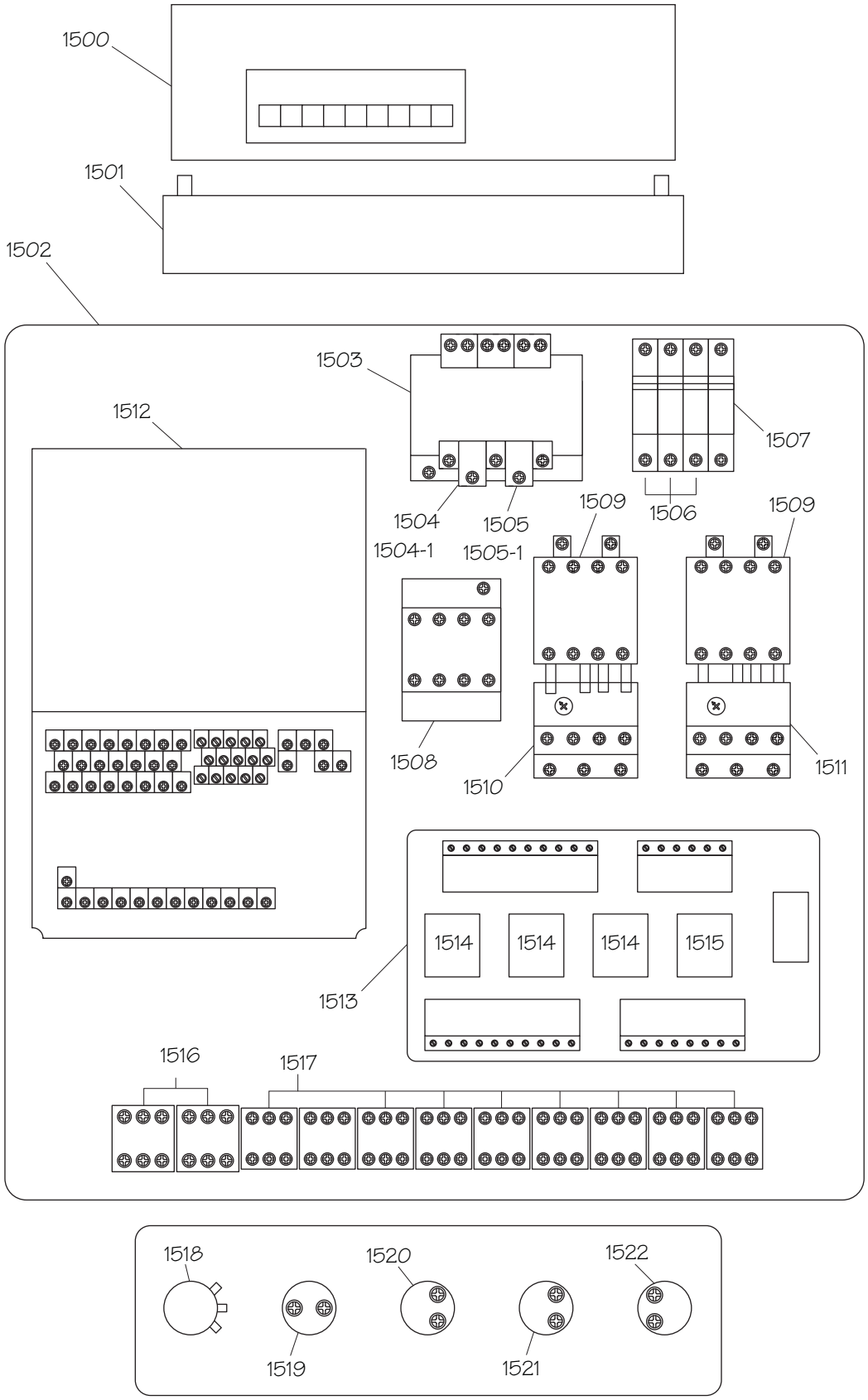
REF	PART #	DESCRIPTION
1400	PSB10511400	STEADY REST ASSEMBLY
1401	PSB10511401	FINGER ADJUSTMENT KNOB
1402	PRP51M	ROLL PIN 4 X 40
1403	PSB10511403	FINGER SPACER
1404	PSB10511404	FINGER ADJUSTMENT SCREW
1405	PSB10511405	FINGER
1406	PSB10511406	DOWEL PIN
1407	P627ZZ	BALL BEARING 627ZZ
1408	PSS20M	SET SCREW M8-1.25 X 8
1409	PSB10511409	CLAMPING SCREW KNOB
1410	PSB10511410	CLAMPING SCREW
1411	PSB10511411	DOWEL PIN
1412	PSB10511400	TOP STEADY REST CASTING
1413	PSB10511400	BOTTOM STEADY REST CASTING
1414	PSB10511414	HINGE PIN
1415	PSB1046PF1708	DOG PT LEAF SCREW M8-1.25 X 25
1416	PN09M	HEX NUT M12-1.75
1417	PLW05M	LOCK WASHER 12MM
1418	PSB10511418	STUD-FT M12-1.75 X 75
1419	PSB10511419	CLAMPING PLATE

Follow Rest



REF	PART #	DESCRIPTION
1450	PSB10511450	FOLLOW REST ASSEMBLY
1451	PSB10511451	FINGER ADJUSTMENT KNOB
1452	PRP51M	ROLL PIN 4 X 40
1453	PSB10511453	FINGER SPACER
1454	PSB10511454	FINGER ADJUSTMENT SCREW
1455	PSB10511455	FINGER
1456	PSB10511456	FINGER TIP
1457	PSS20M	SET SCREW M8-1.25 X 8
1458	PSB10511450	FOLLOW REST CASTING

Electrical Cabinets & Control Panel

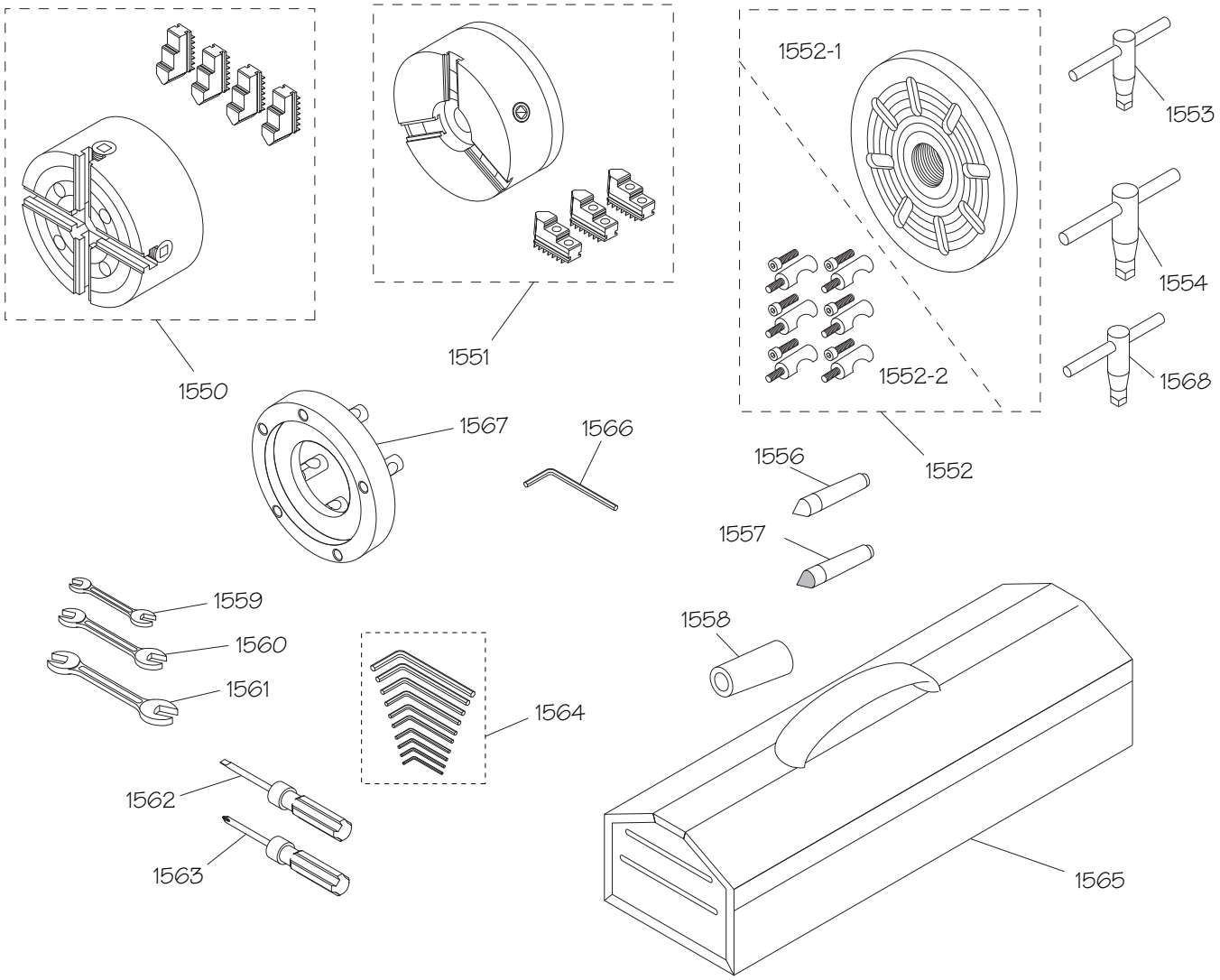


Electrical Cabinets & Control Panel Parts List

REF	PART #	DESCRIPTION
1500	PSB10511500	RPM DISPLAY NEWCAL SPP1406
1501	PSB10511501	RESISTOR
1502	PSB10511502	ELECTRICAL BACK PLATE
1503	PSB10511503	TRANSFORMER SLENG SPTBSW10140
1504	PSB10511504	FUSE HOLDER ASSEMBLY 0-24V
1504-1	PSB10511504-1	FUSE T4A250T GLASS
1505	PSB10511505	FUSE HOLDER W/GROUND ASSY 0-220V
1505-1	PSB10511505-1	FUSE T0.5A250V GLASS
1506	PSB10511506	CIRCUIT BREAKER AB D2514925P 25A
1507	PSB10511507	CIRCUIT BREAKER AB D614925P 6A
1508	PSB10511508	MASTER POWER SWITCH SE16
1509	PSB10511509	CONTACTOR AB 100C09400 24V
1510	PSB10511510	OL RELAY AB 193T1AB25 1.8-2.5A

REF	PART #	DESCRIPTION
1511	PSB10511511	OL RELAY AB 193T1AA40 2.5-0.4A
1512	PSB10511512	INVERTER YASKAWA CIMRG7A25P5
1513	PSB10511513	CIRCUIT BOARD SC0011
1514	PSB10511514	RELAY OMRON MY4NJ 24V
1515	PSB10511515	RELAY OMRON MY2NJ 24V
1516	PSB10511516	TERMINAL BLOCK 3P LARGE
1517	PSB10511517	TERMINAL BLOCK 3P SMALL
1518	PSB10511518	SPINDLE SPEED DIAL
1519	PSB10511519	POWER LIGHT
1520	PSB10511520	COOLANT PUMP SWITCH
1521	PSB10511521	JOG BUTTON
1522	PSB10511522	STOP BUTTON

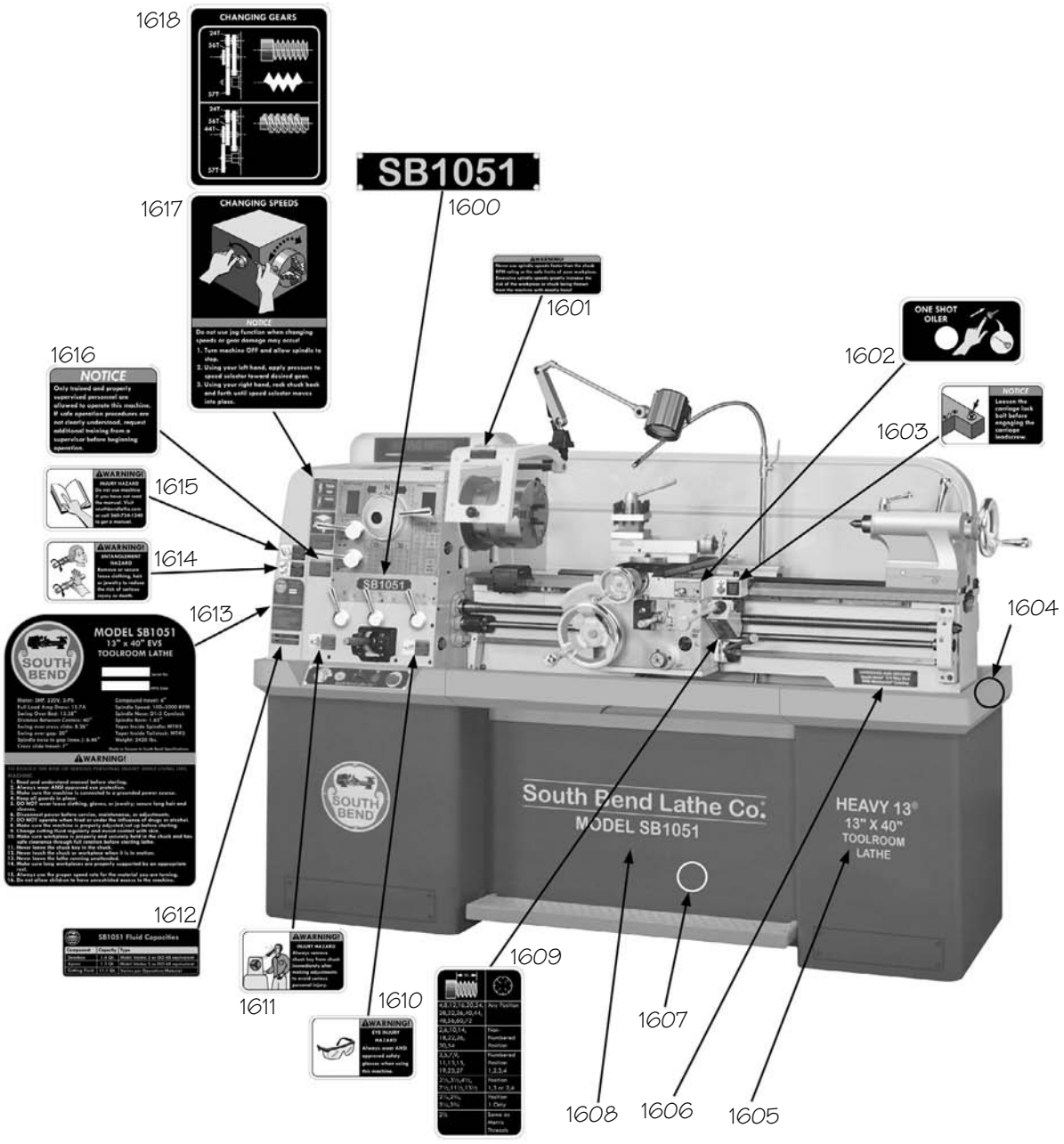
Accessories



REF	PART #	DESCRIPTION
1550	SB1226	4-JAW CHUCK 8" ASSEMBLY
1551	SB1308	3-JAW CHUCK 7" W/2PC JAW SET
1552	PSB10511552	FACEPLATE ASSEMBLY 10"
1552-1	PSB10511552-1	FACEPLATE BODY 10"
1552-2	PSB10511552-2	FACEPLATE CAMLOCK STUD SET
1553	PSB10511553	3-JAW CHUCK KEY
1554	PSB10511554	4-JAW CHUCK KEY
1556	PSB10511556	DEAD CENTER MT#3 HSS TIP
1557	PSB10511557	DEAD CENTER MT#3 CARBIDE TIP
1558	PSB10511558	SPINDLE SLEEVE MT#3/MT#5

REF	PART #	DESCRIPTION
1559	PWR1012	WRENCH 10/12MM
1560	PWR1417	WRENCH 14/17MM
1561	PWR2224	WRENCH 22/24MM
1562	PSDF2	SCREWDRIVER FLAT #2
1563	PSDP2	SCREWDRIVER PHILLIPS #2
1564	PAW1510M	HEX WRENCH SET 10PC 1.5-10MM
1565	PSB10511565	TOOLBOX
1566	PAW08	HEX WRENCH 8MM
1567	SB1399	BACK PLATE D1-5 8-1/4"
1568	PSB10511568	CAMLOCK KEY D1-5

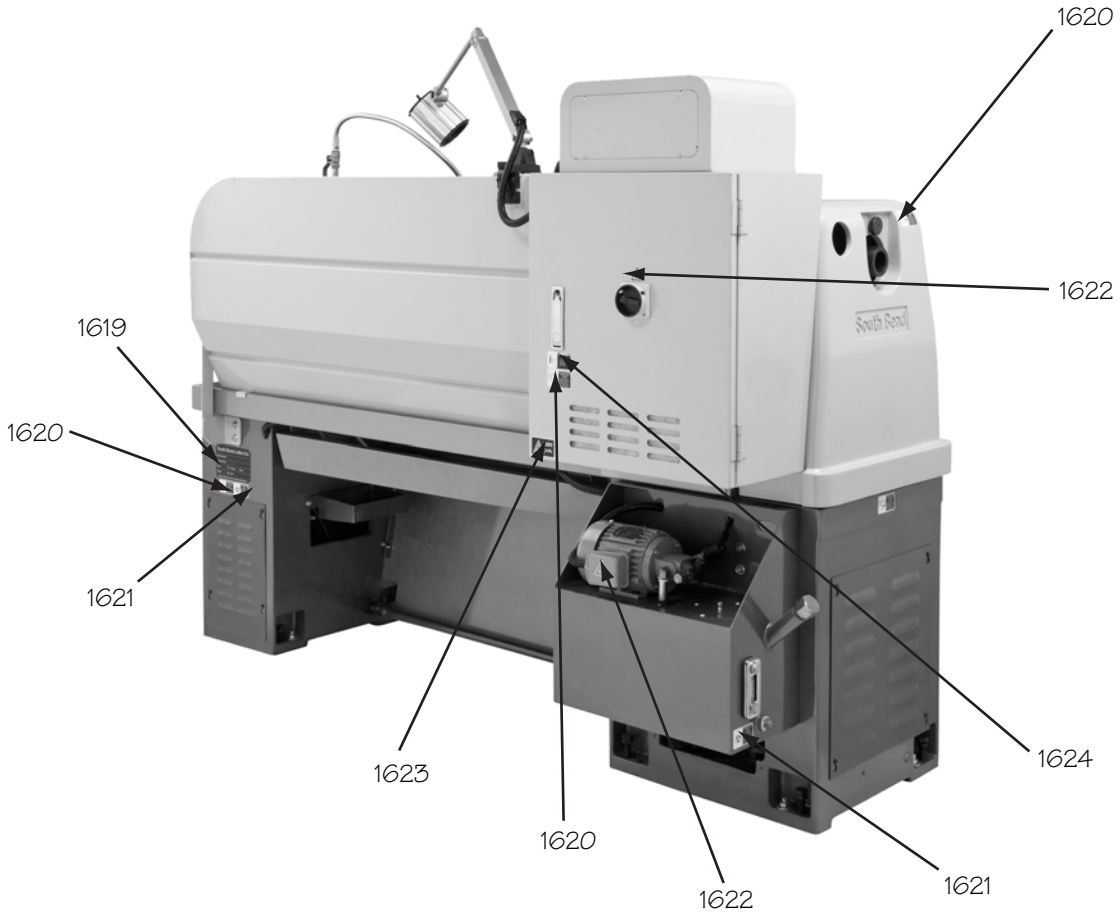
Front Machine Labels



⚠WARNING

The safety labels provided with your machine are used to make the operator aware of the machine hazards and ways to prevent injury. The owner of this machine MUST maintain the original location and readability of these safety labels. If any label is removed or becomes unreadable, REPLACE that label before using the machine again. Contact South Bend Lathe Co. at (360) 734-1540 or www.southbendlathe.com to order new labels.

Rear & Side Machine Labels



REF	PART #	DESCRIPTION
1600	PSB10511600	MODEL NUMBER BRASS PLATE
1601	PSB10511601	SPINDLE SPEED WARNING LABEL
1602	PSB10511602	ONE-SHOT OILER LABEL
1603	PSB10511603	CARRIAGE LOCK LABEL
1604	PSBPAINT02	SB LIGHT BLUE TOUCH-UP PAINT
1605	PSB10511605	HEAVY 13 LABEL
1606	PSB10511606	V-WAY DESCRIPTION LABEL
1607	PSBPAINT03	SB DARK BLUE TOUCH-UP PAINT
1608	PSB10511608	SB MODEL NUMBER LABEL
1609	PSB10511609	DIAL INDICATOR LABEL
1610	PSBLABEL04HL	SAFETY GLASSES LABEL
1611	PSB10511611	CHUCK KEY WARNING LABEL
1612	PSB10511612	FLUID CAPACITIES LABEL

REF	PART #	DESCRIPTION
1613	PSB10511613	MACHINE ID LABEL
1614	PSBLABEL08HS	ENTANGLEMENT LABEL
1615	PSBLABEL01HS	READ MANUAL LABEL
1616	PSB10511616	TRAINED PERSONNEL LABEL
1617	PSB10511617	CHANGING SPEEDS NOTICE LABEL
1618	PSB10511618	CHANGING END GEARS LABEL
1619	PSB10511619	MACHINE INFORMATION LABEL
1620	PSBLABEL02HS	DISCONNECT WARNING LABEL
1621	PSBLABEL06HS	BIOHAZARD WARNING LABEL
1622	PSBLABEL15M	ELECTRICITY LABEL
1623	PSB10511623	VOLTAGE-PHASE LABEL
1624	PSBLABEL16HS	OPEN LATCH LABEL

Warranty

This quality product is warranted by South Bend Lathe Company to the original buyer for one year from the date of purchase. This warranty does not apply to consumable parts, or defects due to any kind of misuse, abuse, negligence, accidents, repairs, alterations or lack of maintenance. We do not reimburse for third party repairs. In no event shall we be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our products.

We do not warrant or represent that this machine complies with the provisions of any law, act, code, regulation, or standard of any domestic or foreign government, industry, or authority. In no event shall South Bend's liability under this warranty exceed the original purchase price paid for this machine. Any legal actions brought against South Bend Lathe Company shall be tried in the State of Washington, County of Whatcom.

This is the sole written warranty for this machine. Any and all warranties that may be implied by law, including any merchantability or fitness, for any purpose, are hereby limited to the duration of this warranty. To take advantage of this warranty, contact us by mail or phone to give us the details of the problem you are having.

Thank you for your business and continued support.

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